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LAKE MICHIGAN WATER QUALITY REPORT

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The City of Chicago, Department of Water and Sewers, Water Purification Division's Water Quality Surveillance Section provided the data, text, and graphics for Section B of this report. Sample analysis was performed by the Water Purification Division's Laboratory Section. Previously this Agency and the City of Chicago conducted separate and to some extent duplicative sampling programs on the lake although the City of Chicago program was more intensive and provided better local coverage. In an effort to trim monitoring costs and provide more efficient use of resources, the City of Chicago and this Agency have established an agreement to jointly participate in lake monitoring and preparation of this report.

Fish flesh analysis data was provided by the U.S. Fish and Wildlife Service Laboratory of Ann Arbor, Michigan.

Updated information on Illinois discharges and pollutional sources was provided by IEPA's Division of Water Pollution Control/Field Operations Section (DWPC/FOS) - Maywood field office. Data summary and interpretation in Section A and C was provided by IEPA's DWPC/FOS Water Quality Unit.

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Introduction

Lake Michigan serves a broad spectrum of purposes. It is the source of drinking water for 5 million residents of northeastern Illinois. Its recreational opportunities attract fishing, boating, swimming and other water-oriented interests. It is the avenue for domestic and international waterborne commerce. Its readily available water for industry and commerce encouraged the growth and development of the greater Chicago metropolitan area into one of the largest industrial-commercial complexes in the United States. Ironically, Lake Michigan has also been the recipient of municipal and industrial wastes throughout its watershed.

Discharges from industrial complexes located along the entire shore of Lake Michigan affect the quality of Illinois waters. These discharges, consisting of process, cooling, dilution and other waste waters, have adverse effects on the local environment as well as the total ecology of the lake. Inadequately treated sewage effluents, bypasses from overloaded sewage treatment facilities and combined sewer overflows contribute to the lake's organic enrichment. The aging or eutrophication of Lake Michigan is accelerated by the addition of nutrients from both industrial and municipal discharges. While the number of discharges in Illinois are few and have little impact on the overall quality of Lake Michigan, local problems have resulted.

In addition to man-made inputs to Lake Michigan, lake water quality is also affected by natural phenomena. During most of the year, from about April to November, the lake is thermally stratified. The formation of thermoclines during this period prevents the free exchange of dissolved oxygen between these layers and results in the reduction of dissolved oxygen near the lake bottom. Stratification is destroyed during late fall and spring overturns. Mixing occurs between the surface and bottom waters during these overturns resulting in some resuspension of settled bottom deposits. At these times, there are noticeable and measurable increases in turbidity, color and mineral concentrations.

Lake currents influence water quality by distributing polluted discharges. Effluents may be carried a considerable distance from the point of discharge through physical transport or may remain near the point of discharge depending on lake currents. In the areas affected by a pollutional discharge, sludge-like deposits may accumulate on the lake bottom affecting aquatic life. Organisms tolerant to the altered habitats will remain while the more sensitive forms either migrate out of the area of influence or die. In extreme cases no life survives. Tributary streams and rivers add to the sediment and nutrient levels of the lake. As these waters flow downstream, sediments, nutrients, fertilizers, pesticides and other substances are acquired through erosion, land runoff, and from industrial and municipal waste discharges. There are no major tributaries to Lake Michigan in Illinois.

Climatic factors, too, exert their influence on lake water quality. Increases in bacteria counts, suspended and dissolved solids and organic and nutrient levels can be expected following a storm and resulting storm water runoff.

Recognizing the importance of Lake Michigan as a natural asset, the 75th Illinois General Assembly authorized the Illinois Environmental Protection Agency to ".... regularly conduct water quality and lake bed surveys to evaluate the ecology and the quality of water in Lake Michigan." Monitoring programs have provided information on the condition of the Illinois waters of Lake Michigan. As data are gathered on a continuing basis, it should be possible to determine long-term trends in lake water quality.

Lake water quality has been evaluated on the basis of the water quality standards promulgated by the Illinois Pollution Control Board. Three categories of standards are in force in Illinois depending on the use(s) to be made of the particular body of water. The General Standards are designed to "....... protect the State's water for aquatic life, agricultural use, primary and secondary contact use, and most industrial uses, and ensure the aesthetic quality of the State's aquatic environment." Waters used as sources of potable water and for food processing must, in addition to meeting the General Standards, meet the more stringent Public and Food Processing Water Supply Standards. Additionally, critical parameters were designated as part of the Lake Michigan Standards. Lake waters, in addition to meeting the General and Public and Food Processing Water Supply Standards, must meet the strict standards for:

pH
Ammonia Nitrogen
Chloride
Sulfate
Phosphorus
Total Dissolved Solids
Fecal Coliform

In this report the shore and offshore data were evaluated on the basis of the Lake Michigan Standards for the above parameters. Standards applicable to the Public and Food Processing Water Supply were used to evaluate those offshore parameters not specifically covered by the Lake Michigan standard. Shore water quality, which is adversely affected by waste discharges, land runoff, and storms to a much greater extent than offshore water, was evaluated on the basis of the General Standards for those parameters not part of the Lake Michigan Standards.

Location of sampling sites are shown in Figure 1.

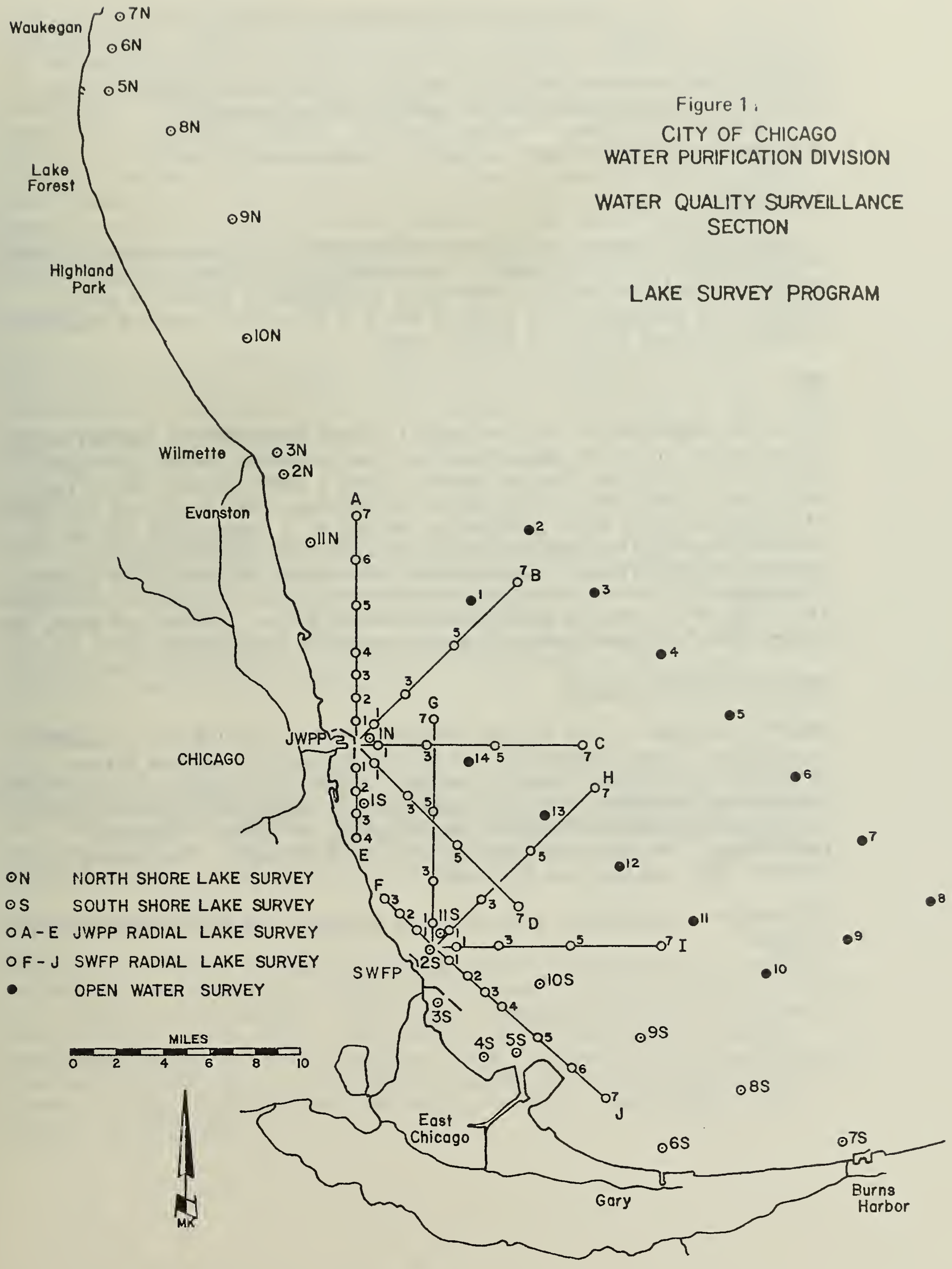


Figure 1.

CITY OF CHICAGO
WATER PURIFICATION DIVISION

WATER QUALITY SURVEILLANCE
SECTION

LAKE SURVEY PROGRAM

Section A

Water Quality Evaluation, 1977[a]

In 1977, most water quality parameters tested remained within state standards with the exception of ammonia and phosphorus.

A brief discussion of each parameter is presented below:

Turbidity

Turbidity is a measure of the extent to which light penetration in water is diminished by the presence of suspended and colloidal matter. Measurement of turbidity is expressed in Formenzin turbidity units (FTU). The average of 398 samples was 0.8 FTU. The standard requires turbidity values to be 1.0 FTU or less.

pH

pH is the logarithm of the reciprocal of the hydrogen ion concentration. In practice, it is the measurement of the concentration of hydrogen ions. By definition, the pH range is from 0 (very acidic) to 14 (very alkaline). Since the concentration of hydrogen ions regulates the degree of dissociation of many substances, pH may be a significant factor in determining limiting threshold concentrations in natural waters. Abnormal fluctuations in pH may be an indication of industrial waste discharges. The Lake Michigan Standard requires pH values to be within the range of 7.0 to 9.0 except for natural causes. During the year, 398 pH analyses were performed. The mean of these analyses was 8.4.

Ammonia Nitrogen (as N)

Ammonia nitrogen is one of the compounds resulting from the metabolic activity of living organisms. It may be present in surface waters as a result of agricultural runoff, certain industrial wastes, and runoff from pastures or feedlots. It is a component of sewage and relatively high concentrations may be found in the effluents of sewage treatment facilities. The Lake Michigan Standard is 0.02 mg/l. The average of all samples (398 samples) was 0.03 mg/l.

[a] Averages include data from the five surveys conducted by the City of Chicago.

Nitrate & Nitrite (as N)

Nitrates are the metabolic end products of organic nitrogen decomposition. They are commonly found in surface waters as a result of the decomposition of organic nitrogen in polluted streams and from sewage effluents, agricultural runoff, cesspool leaching, and industrial discharges. Nitrites in natural waters result from bacterial action upon ammonia and organic nitrogen. Because they are readily oxidized to nitrates, nitrites are not normally found in significant concentrations in surface waters. If present in sufficient concentrations in public water supplies, nitrate-nitrite may cause infant methemoglobinemia, a disease causing blood changes and cyanosis. The Public and Food Processing Water Supply Standard for nitrate-nitrite is 11 mg/l. The average of all samples is 0.2 mg/l.

Chloride

Chlorides are one of the most common naturally occurring chemical constituents of surface waters. Sanitary wastes and certain industrial discharges may contribute significant amounts to receiving streams. The Lake Michigan Standard is 12 mg/l. The average of 37 samples was 9.3 mg/l.

Phenols

Phenols are associated with industrial wastes from coal distillation processes and the manufacture of plastics, dyes, and disinfectants. Relatively small concentrations can cause taste and odor problems in public water supplies. The General Standard for phenols is 0.1 mg/l. Of the 352 samples analyzed, 16 samples had maximum values of 0.002 mg/l, 36 samples were found at 0.001 mg/l, and the remainder (300) had no detectable levels (i.e, <.001 mg/l).

Sulfate

Sulfate is a component of natural bodies of water. Abnormal fluctuations in background levels may be the result of industrial waste discharges. In drinking water supplies, high sulfate concentrations may have a cathartic effect. The Lake Michigan Standard is 24 mg/l. The average of 69 water quality samples was 21 mg/l.

Phosphorus (as P)

Phosphorus is found in domestic sewage, some industrial wastes, and in drainage from agricultural areas. It is one of the nutrients responsible for excessive algae growth. An effluent standard for waste discharges to Lake Michigan has resulted in the interim use of chemicals to reduce phosphorus levels in sewage treatment plant effluents. The Lake Michigan Standard is 0.007 mg/l. Three hundred twenty-six of 398 samples had concentrations exceeding the 0.007 mg/l standard. The average of all samples was 0.02 mg/l.

Total Solids (Dissolved)

Dissolved solids in high concentrations are undesirable in drinking water supplies because of their possible laxative and unpalatable taste properties. In the aquatic ecosystem they provide essential nutrients in productivity cycles. At very high concentrations they may exert osmotic or toxic stresses on fish and other aquatic life. The Lake Michigan Standard is 180 mg/l. Forty-two samples were analysed and the average of these was 177 mg/l.

Fecal Coliform

Present laboratory methods for the detection of disease-producing bacteria are complex, time-consuming and are not readily amendable to routine water quality monitoring programs. The fecal coliform group of bacteria, which are nonpathogenic inhabitants of the intestinal tracts of warmblooded animals, is closely associated with fecal and sewage discharges. Consequently, this group serves as a reliable indicator of recent sewage contamination.

The Lake Michigan fecal coliform standard, which is based on a minimum of five samples taken within a 30-day period, requires that the geometric mean not exceed 20 per 100 ml. Although individual lake surveys are not conducted with this frequency, fecal coliform levels are calculated as geometric means to evaluate values in relation to the standard. The annual geometric mean of all water quality samples was 2 per 100 ml.

Iron

Iron is a natural component of surface water. The presence of iron in higher concentrations is generally related to industrial and sewage discharges. The General Standard for iron is 1.0 mg/l. The average of 181 water quality samples was 0.02 mg/l.

A summary of the above parameters including annual average (whole lake), open water average, shoreline average, and standard or guideline value is presented in the following table. In addition to these parameters, data for the following have been included:

- Organic Nitrogen
- Sodium
- Potassium
- Chemical Oxygen Demand (COD)
- Non-Filtrable Solids
- Silica
- Total Coliform
- Fecal Streptococcus

Table 1. Water quality summary, 1977

WATER QUALITY EVALUATION - 1977

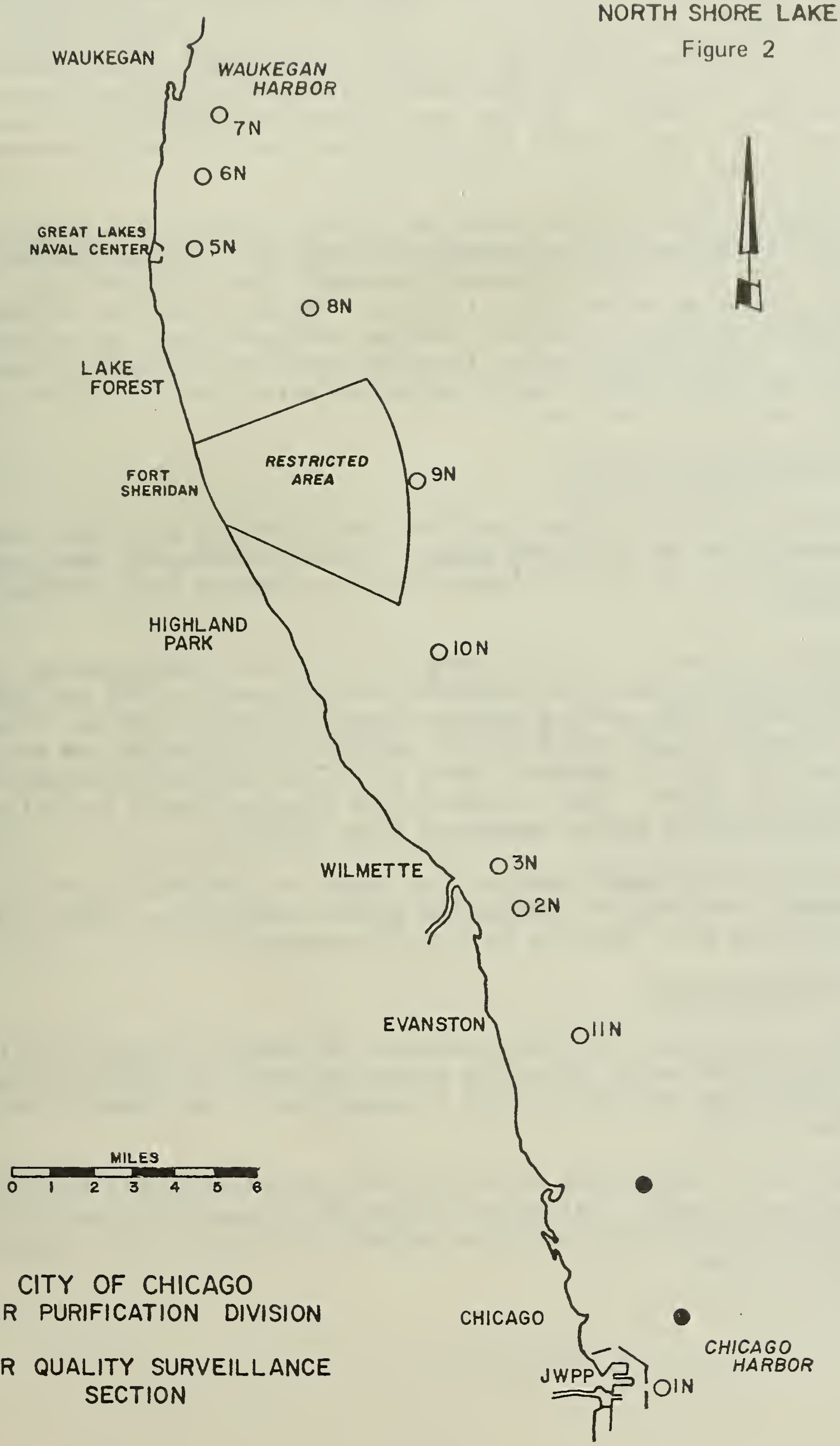
Parameter	Standard or Guideline	Annual Average (X/Sample Size)		
		Lake(g)	Shore-line	Open Water
Turbidity	1.0 TU (e)	0.8/398	1.1/171	0.39/46
pH	7.0-9.0 units (a)	8.4/398	8.4/171	8.4/46
Ammonia (N)	0.02 mg/l (a)	0.03/398	0.04/171	0.02/46
Chloride	12. mg/l (a)	9.3/37	-	9.4/14
Phenols	0.1 mg/l (b)	<.001/352	<.001/171	-
Sulfates	24. mg/l (a)	21/69	-	20/46
Phosphorus (P)	0.007 mg/l (a)	0.02/398	0.02/177	0.01/46
Total Solids (Dissolved)	180. mg/l (a)	177/42	-	177/42
Non-Filtrable Solids	(mg/l)	8/20	-	-
Fecal Coliform	20./100 ml (a)(d)(f)	2/389	2/162	1/46
Nitrate & Nitrite	11 mg/l (c)	0.2/69	-	.2/46
Iron (Total)	1.0 mg/l (b)	0.02/181	-	-
Organic Nitrogen	(mg/l)	0.16/195	-	0.13/14
Sodium	(mg/l)	4.7/46	-	4.7/46
Potassium	(mg/l)	1./46	-	1./46
Silica	(mg/l)	1.1/46	-	1.1/46
COD	(mg/l)	7.7/398	69/171	8.8/14
Total Coliform	(per/100 ml)	44/389	709/162	1/46
Fecal Streptococcus	(per/100 ml)	1/389	2/162	0/46

(a) Lake Michigan Standard - ¶206 Water Pollution Regulations, Chapter 3.
(b) General Standard - ¶203 Water Pollution Regulations, Chapter 3.
(c) Public and Food Processing Water Supply - ¶204 Water Pollution Regulations, Chapter 3.
(d) Based on a minimum of five samples taken over not more than a 30-day period, fecal coliforms shall not exceed a geometric mean of 20 per 100 ml.
(e) Finished Water Quality - ¶304 Public Water Supplies, Chapter 6.
(f) In the calculations of geometric mean, all zero values were interpreted to be equal to 1.
(g) Averages include data from all five surveys.

Section B

Lake Michigan
1. North Shore Lake Survey

LAKE MICHIGAN
NORTH SHORE LAKE SURVEY
Figure 2



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NORTH SHORE LAKE SURVEY

The North Shore Lake Survey consists of ten sample points between the City of Chicago Jardine Water Purification Plant and the harbor at Waukegan, Illinois. The ten sample points are numbered 1N through 11N (point 4N is not sampled due to its location in a restricted area) and are located from 1 to 4 miles offshore.

During the past several years, most effluents along the north shore have been eliminated or diverted away from the lake. At the beginning of 1977, the only remaining sewage treatment plant effluents were located at Fort Sheridan and Waukegan, Illinois. The Fort Sheridan effluent was diverted during 1977 and the Waukegan effluent should be diverted in May, 1978. Remaining discharges along the north shore consist primarily of cooling water. Other factors affecting water quality include creeks and boat harbors in the area.

Microbiological Quality

Graphs of total and fecal coliform levels for the past four years are presented on the following pages. Full microbiological data for 1977 is presented in the Microbiological Analyses Summary Table following the graphs.

Offshore bacterial quality along the north shore continues to be very good. The maximum total coliform level observed in 1977 was 204 per 100 milliliters (ml) and the maximum average was 26 per 100 ml. Fecal coliform averages were 0 for all points except 1N which had an average of 2 per 100 ml as a geometric mean, well below the Lake Michigan standard of 20 per 100 ml. Fecal streptococcus averages were 0 for all points except 1N which had an average of 5 per 100 ml.

The results of sample analyses for algae are presented in the Algae Summary Table and the predominant genera observed are listed. Algae of the Diatom group continue to be most abundant.

Chemical Quality

Comparison graphs for total phosphate and ammonia nitrogen levels over the past four years follow the graphs for total and fecal coliform. All chemical data obtained in 1977 is summarized in the Chemical Analyses Summary Table.

There is no significant trend for total phosphate levels and they tend to vary considerably. All points exceed the standard limit of 0.02 milligrams per liter (mg/l) and reflect the high levels of phosphorus in Lake Michigan.

A significant decrease in ammonia nitrogen levels has occurred along the north shore over the past four years and may be a result of elimination of sewage treatment plant effluents in the area. All average values were 0.01 mg/l except point 1N which was at the standard limit of 0.02 mg/l.

Figure 3

NORTH SHORE LAKE SURVEY
TOTAL COLIFORM
ANNUAL AVERAGE

1974 - 1977

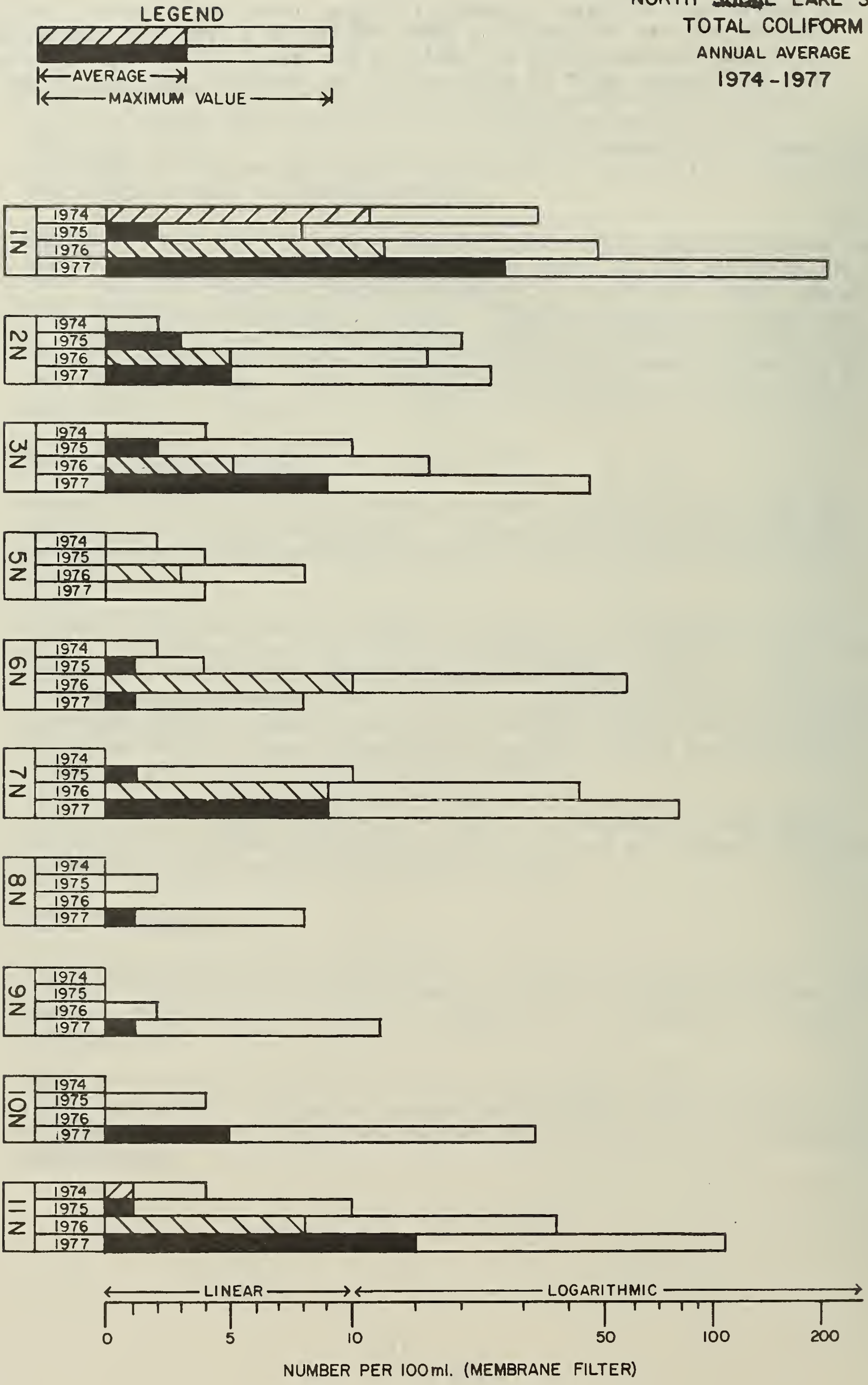


Figure 4
NORTH SHORE LAKE SURVEY
FECAL COLIFORM
ANNUAL AVERAGE
1974 - 1977

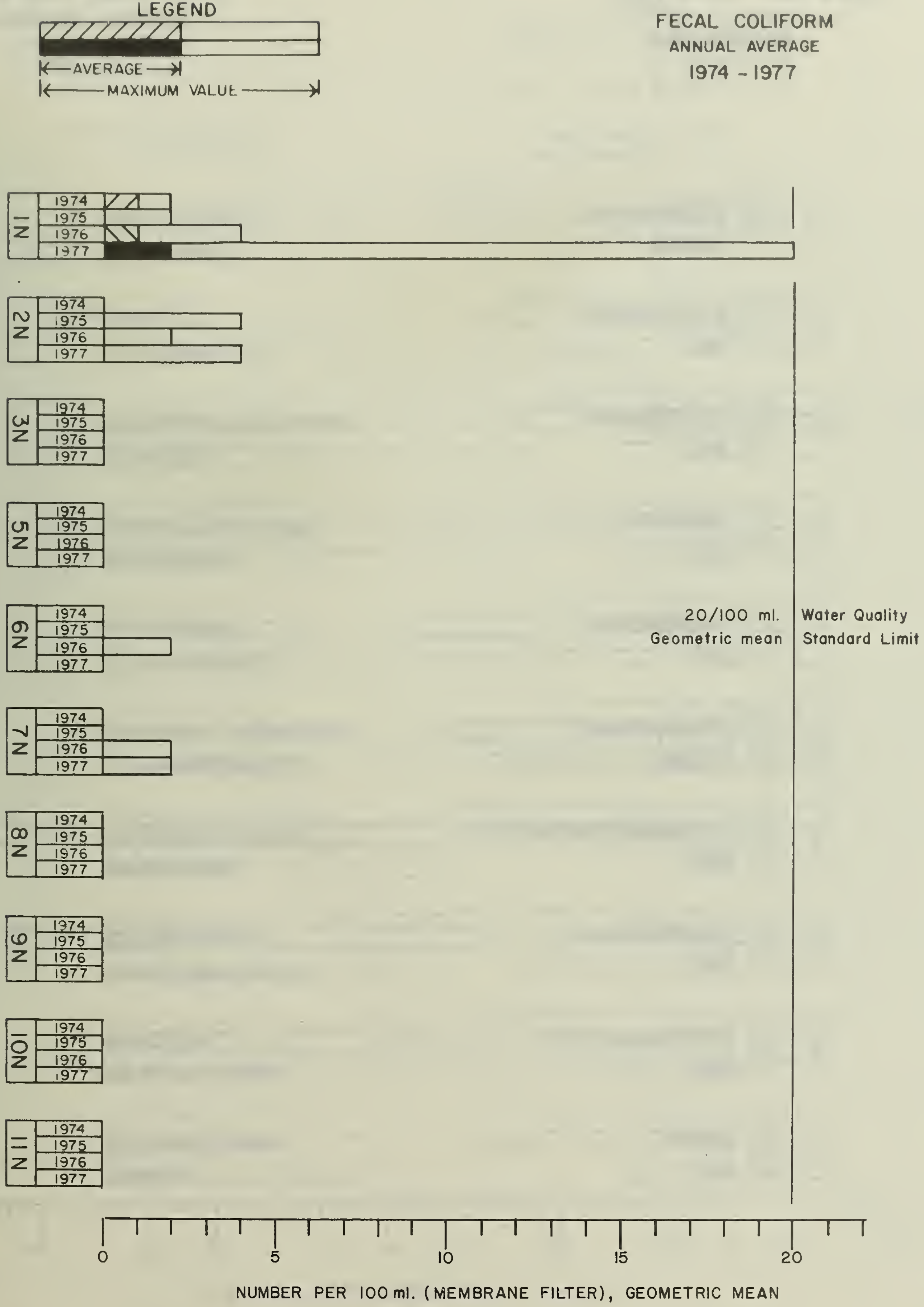


Figure 5
NORTH SHORE LAKE SURVEY
AMMONIA NITROGEN
ANNUAL AVERAGE
1974 - 1977

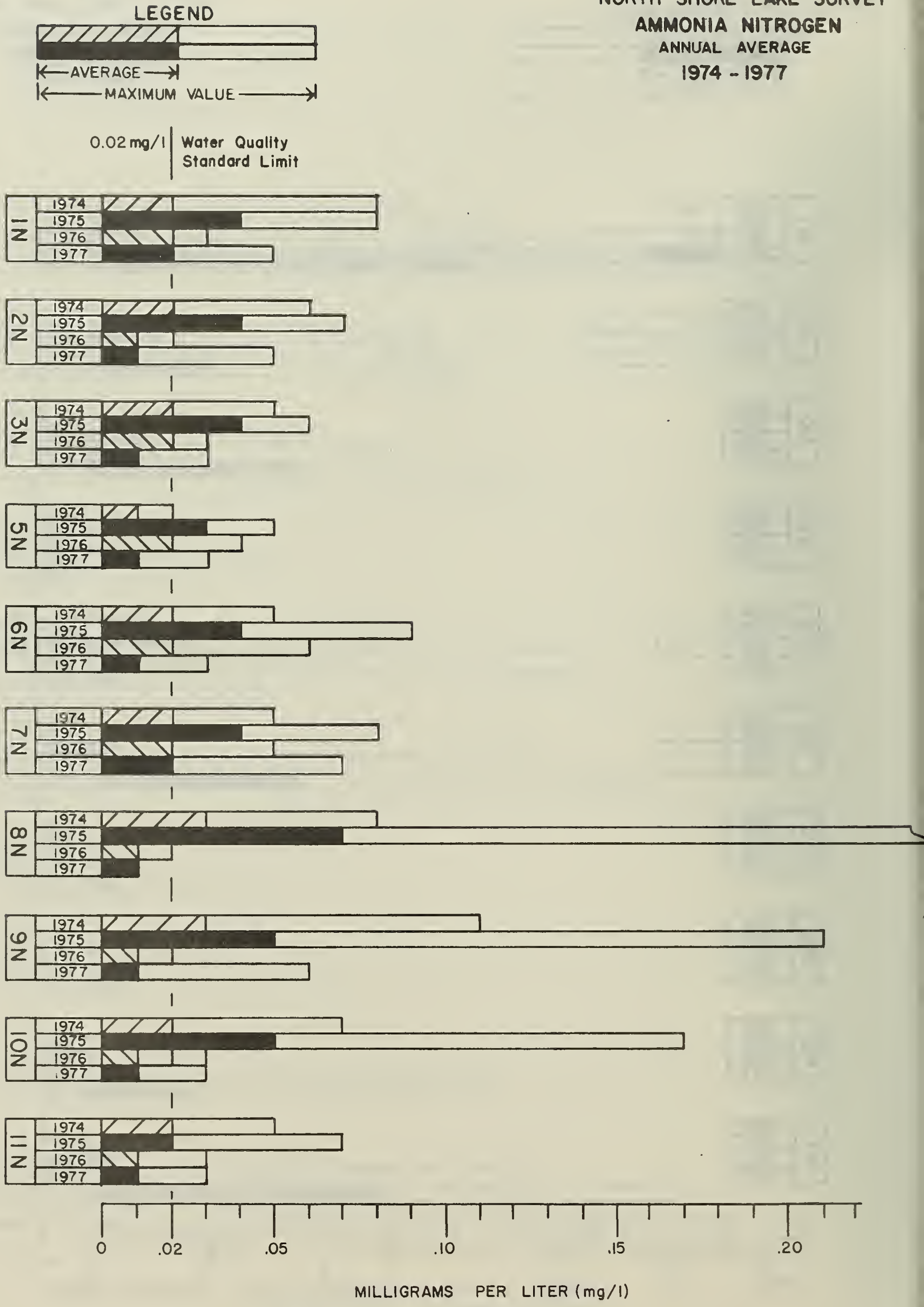


Figure 6

NORTH SHORE LAKE SURVEY
TOTAL PHOSPHATE
ANNUAL AVERAGE
1974 - 1977

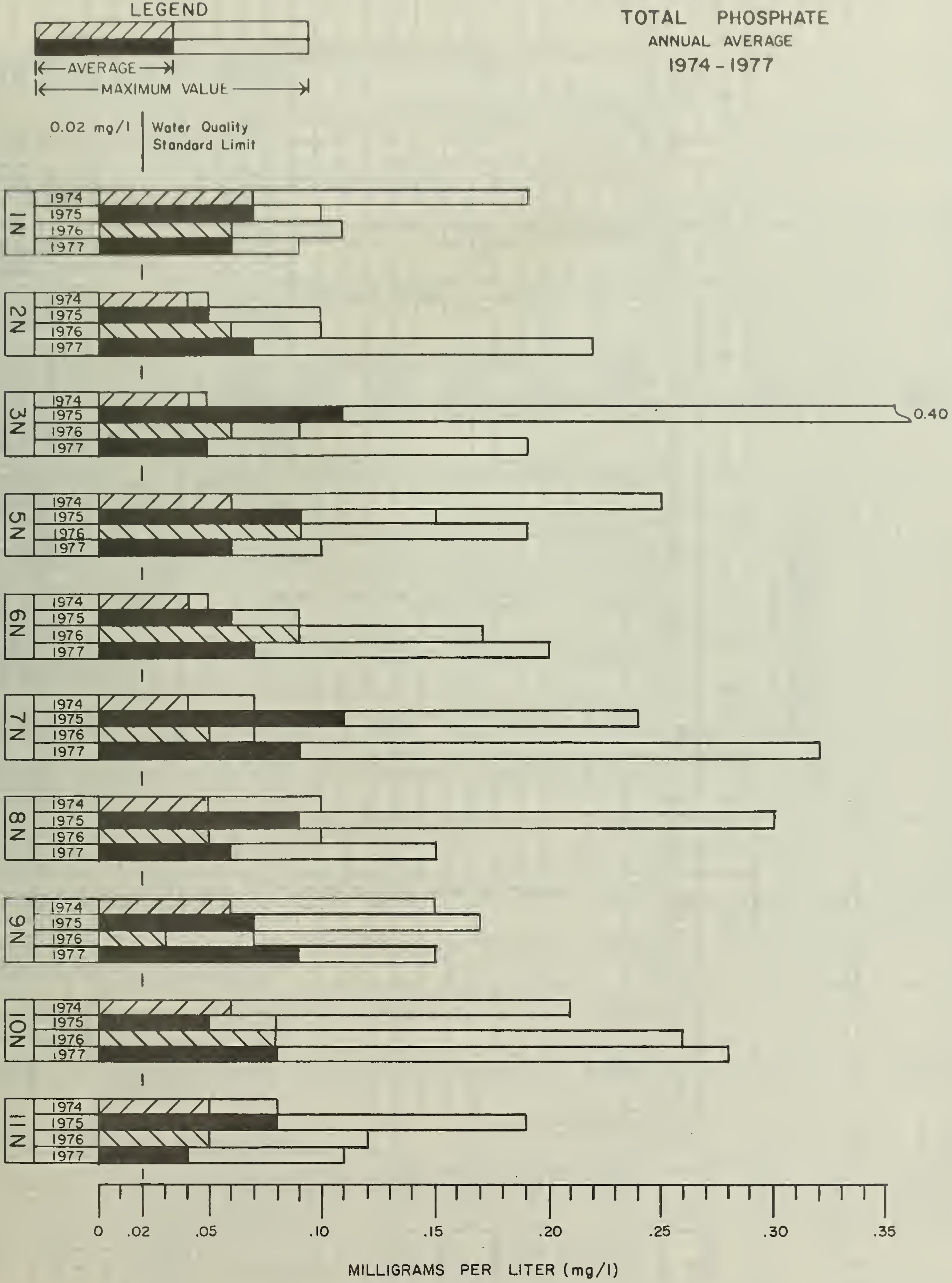


Table 2

NORTH SHORE LAKE SURVEY
COMPARISON TABLE
1971-1977

PARAMETER	YEAR	1 N		2 N		3N		5 N		6 N		7 N		8 N		9 N		10 N		11N			
		MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.		
TOTAL COLIFORM M.F. NO./100ml.	1971	52	25	84	25	72	26	80	26	74	30	104	32	26	6	24	5	10	3	80	21		
	1972	76	32	60	20	68	27	12	3	46	12	60	14	16	3	10	2	8	2	12	5		
	1973	40	12	36	12	54	11	128	48	62	36	74	25	2	1	14	3	10	4	28	6		
	1974	32	11	2	0	4	0	2	0	2	0	0	0	0	0	0	0	0	0	4	1		
	1975	8	2	20	3	10	2	4	0	4	1	10	1	2	0	0	0	4	0	10	1		
	1976	48	12	16	5	16	5	5	3	56	10	42	9	0	0	2	0	0	0	36	8		
	1977	204	26	24	5	45	9	4	0	8	1	80	9	8	1	12	1	32	5	108	15		
FECAL COLIFORM M.F. NO./100ml.	1971	16	2	4	1	4	2	6	1	6	2	20	3	0	0	0	0	2	1	0	0		
	1972	12	1	0	0	2	2	0	0	2	1	36	2	0	0	0	0	0	0	0	0		
	1973	0	0	0	0	0	0	26	2	12	2	8	2	4	1	0	0	0	0	0	0		
	1974	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1975	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1976	4	1	2	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0		
	1977	20	2	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0		
NITROGEN AMMONIA mg/l	1971	0.10	0.05	0.11	0.07	0.12	0.06	0.11	0.05	0.11	0.06	0.12	0.06	0.11	0.06	0.12	0.07	0.13	0.06	0.12	0.06		
	1972	0.05	0.04	0.09	0.04	0.06	0.03	0.05	0.03	0.05	0.03	0.05	0.03	0.05	0.03	0.06	0.03	0.05	0.03	0.05	0.03		
	1973	0.10	0.03	0.06	0.03	0.05	0.02	0.05	0.02	0.05	0.02	0.05	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02		
	1974	0.08	0.02	0.06	0.02	0.05	0.02	0.02	0.01	0.05	0.02	0.05	0.02	0.06	0.03	0.11	0.03	0.07	0.02	0.05	0.02		
	1975	0.08	0.04	0.07	0.04	0.06	0.04	0.05	0.03	0.09	0.04	0.06	0.04	0.38	0.07	0.21	0.05	0.17	0.05	0.07	0.04		
	1976	0.03	0.02	0.02	0.01	0.03	0.02	0.04	0.02	0.06	0.02	0.05	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.03	0.01		
	1977	0.05	0.02	0.05	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.07	0.02	0.01	0.01	0.06	0.01	0.03	0.01	0.03	0.01		
PHOSPHATE TOTAL mg/l	1971	0.12	0.07	0.15	0.06	0.12	0.07	0.08	0.05	0.09	0.06	0.15	0.07	0.15	0.07	0.11	0.06	0.11	0.06	0.07	0.04		
	1972	0.19	0.10	0.15	0.07	0.11	0.07	0.11	0.05	0.16	0.07	0.13	0.05	0.13	0.07	0.09	0.05	0.19	0.09	0.14	0.06		
	1973	0.06	0.05	0.11	0.04	0.05	0.03	0.07	0.04	0.12	0.06	0.06	0.04	0.06	0.03	0.04	0.03	0.05	0.03	0.04	0.03		
	1974	0.19	0.07	0.05	0.04	0.05	0.04	0.25	0.06	0.05	0.04	0.07	0.04	0.10	0.05	0.15	0.06	0.21	0.06	0.08	0.05		
	1975	0.10	0.07	0.10	0.05	0.40	0.11	0.15	0.09	0.09	0.06	0.24	0.11	0.30	0.09	0.17	0.07	0.08	0.05	0.19	0.08		
	1976	0.11	0.06	0.10	0.06	0.09	0.06	0.19	0.09	0.17	0.09	0.07	0.05	0.10	0.05	0.07	0.03	0.26	0.08	0.12	0.05		
	1977	0.09	0.06	0.22	0.07	0.19	0.05	0.10	0.06	0.20	0.07	0.32	0.09	0.15	0.06	0.15	0.09	0.28	0.06	0.11	0.04		

NOTE: FECAL COLIFORM AVG. IS GEOMETRIC MEAN

Table 3

NORTH SHORE LAKE SURVEY
1977
MICROBIOLOGICAL ANALYSES SUMMARY TABLE

9 SURVEYS		PLATE COUNT PER ml. 24 HR 35° C	TOTAL COLIFORM PER 100 ml. M.F.	FECAL COLIFORM PER 100 ml. M.F.	FECAL STREP PER 100 ml. M.F.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml.
STORET NO.		31751	31503	31616	31679	60050		
1N	MAX.	120	204	20	36	1460	5	10
	AVG.	20	26	2	5	808	1	2
2N	MAX.	14	24	4	2	1420	1	3
	AVG.	3	5	0	0	603	0	0
3N	MAX.	17	45	0	0	1200	0	1
	AVG.	3	9	0	0	555	0	0
5N	MAX.	4	4	0	2	1060	2	1
	AVG.	1	0	0	0	380	0	0
6N	MAX.	10	8	0	0	440	1	2
	AVG.	2	1	0	0	294	0	0
7N	MAX.	20	80	2	0	580	2	1
	AVG.	5	9	0	0	286	0	1
8N	MAX.	7	8	0	0	600	1	1
	AVG.	2	1	0	0	291	0	0
9N	MAX.	6	12	0	0	1320	0	1
	AVG.	2	1	0	0	351	0	0
10N	MAX.	4	32	0	0	1120	0	0
	AVG.	1	5	0	0	434	0	0
11N	MAX.	31	108	0	2	980	0	0
	AVG.	4	15	0	0	550	0	0

NOTE: FECAL COLIFORM AVG. IS GEOMETRIC MEAN

WATER QUALITY SURVEILLANCE SECTION

Table 4

NORTH SHORE LAKE SURVEY
ALGAE SUMMARY TABLE

ORGANISMS PER ML.

1977

	SURVEY DATE	FEB. 23	MAR. 15	APR. 14	MAY 17	JUNE 16	JULY 7	AUG. 16	OCT. 4	NOV. 17
1 N	DIATOMS	1,460 FMA	680 FASn	1,120 FA	40 SNz	NO SAMPLE	1,200 FA	320 A	360 TF	760 T
	FLAGELLATES			180 DE				100 DE		
	GREENS							80 O		
	BLUE-GREENS				60 A			40 A		60 AG
2 N	DIATOMS	1,420 FM	600 AFS	940 FM	40 SSn	NO SAMPLE	20 S	320 T	260 T	920 TA
	FLAGELLATES							80 D		20 D
	GREENS							40 S		
	BLUE-GREENS				40 A			60 A		60 AG
3 N	DIATOMS	1,200 FM	900 MA	780 FT	20 R	NO SAMPLE	100 FSSn	600 TA	20 S	600 TA
	FLAGELLATES									
	GREENS									
	BLUE-GREENS						140 O	40 AG	40 O	
5 N	DIATOMS	NO SAMPLE	1,060 AS	NO SAMPLE	40 Sn	NO SAMPLE	120 ASn	260 A	20 S	80 SN
	FLAGELLATES							360 D	200 D	
	GREENS							80 CO		
	BLUE-GREENS								40 O	
6 N	DIATOMS	NO SAMPLE	360 MFSn	440 TF	20 Sn	NO SAMPLE	180 A	360 FA	340 TA	280 TAN
	FLAGELLATES									
	GREENS									
	BLUE-GREENS								20 G	40 G
7 N	DIATOMS	NO SAMPLE	160 FASn	580 MA	40 SnNz	NO SAMPLE	40 Sn	360 AS	480 TAS	160 TA
	FLAGELLATES							20 C		
	GREENS									
	BLUE-GREENS							120 AAg		60 GA
6 N	DIATOMS	NO SAMPLE	600 MF	500 FA		NO SAMPLE	40 A	80 A	240 FS	20 N
	FLAGELLATES							320 D	20 P	
	GREENS									
	BLUE-GREENS				80 A				100 GM	60 AG
9 N	DIATOMS	NO SAMPLE	1,320 FM	540 FN		NO SAMPLE		120 A	20 Nz	220 TF
	FLAGELLATES							80 D		
	GREENS									
	BLUE-GREENS							20 A	20 G	120 OG
10 N	DIATOMS	NO SAMPLE	1,120 MF	600 MF	140 S	NO SAMPLE	400 FA	280 A	40 SAM	260 TS
	FLAGELLATES								20 C	
	GREENS							40 O		
	BLUE-GREENS							60 AG	20 G	60 A
11 N	DIATOMS	980 FM	760 MF	600 FT		NO SAMPLE	610 FA	280 TA	420 FT	680 TA
	FLAGELLATES									
	GREENS							20 P		
	BLUE-GREENS								20 G	20 A

NOTE: LETTERS DESIGNATE SPECIFIC GENERA IN ORDER OF ABUNDANCE, SEE KEY ON FOLLOWING PAGE.

KEY TO ALGAE SUMMARY TABLES

The following genera are specified by the letters used in the tables;

DIATOM algal group

A - Asterionella
Am - Ampiphora
C - Cyclotella
Cb - Cymbella
Ct - Cymatopleura
D - Diatoma
F - Fragilaria
M - Melosira
N - Navicula
Nz - Nitzschia
R - Rhizosolenia
S - Stephanodiscus
Sn - Synedra
T - Tabellaria

FLAGELLATE algal group

C - Ceratium
Cl - Chlamydomonas
D - Dinobryon
E - Euglena
G - Gymnodinium
M - Mallomonas
P - Peridinium
S - Synura
V - Volvox

GREEN algal group

A - Ankistrodesmus
C - Cosmarium
Cd - Cladophera
Cl - Closterium
Co - Coelastrum
M - Mougeotia
Mc - Micractinium
O - Oocystis
Od - Oedogonium
P - Pediastrum
S - Scenedesmus

BLUE - GREEN algal group

A - Anacystis
Ag - Agmenellum
An - Anabaena
C - Chroococcus
G - Gomphospheria
L - Lyngbia
M - Microcystis
O - Oscillatoria

NORTH SHORE LAKE SURVEY

1977

CHEMICAL ANALYSES SUMMARY TABLE

9 SURVEYS		pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS mg/l	NITROGEN AMMONIA mg/l	PHOSPHATE TOTAL mg/l	PHOSPHATE DISSOLVED mg/l	OXYGEN DEMAND CHEMICAL
STORET NO.		00400	00076	00086	32730	00610	00650	00653	00340
1N	MAX.	8.5	17.00	3Df	2	0.05	0.09	0.05	18.7
	AVG.	8.4	3.00	2	<1	0.02	0.06	0.03	9.0
2N	MAX.	8.5	2.80	2Df	<1	0.05	0.22	0.11	23.2
	AVG.	8.4	0.98	1	<1	0.01	0.07	0.03	7.6
3N	MAX.	8.5	2.00	2DM	1	0.03	0.19	0.07	21.4
	AVG.	8.4	0.87	1	<1	0.01	0.05	0.02	6.7
5N	MAX.	8.5	1.60	2M	1	0.03	0.10	0.04	13.3
	AVG.	8.5	0.66	1	<1	0.01	0.06	0.03	5.8
6N	MAX.	8.5	2.00	2M	1	0.03	0.20	0.18	14.3
	AVG.	8.5	0.79	1	<1	0.01	0.07	0.04	5.0
7N	MAX.	8.5	7.50	1M	<1	0.07	0.32	0.28	15.2
	AVG.	8.4	1.50	1	<1	0.02	0.09	0.05	7.5
8N	MAX.	8.5	0.85	2M	1	0.01	0.15	0.13	11.4
	AVG.	8.4	0.55	1	<1	0.01	0.06	0.05	6.4
9N	MAX.	8.6	0.70	1M	<1	0.06	0.15	0.10	11.5
	AVG.	8.5	0.47	1	<1	0.01	0.09	0.04	6.7
10N	MAX.	8.6	0.95	2DM	1	0.03	0.28	0.18	21.0
	AVG.	8.5	0.55	1	<1	0.01	0.08	0.04	8.4
11N	MAX.	8.6	2.90	2M	1	0.03	0.11	0.03	12.5
	AVG.	8.4	1.03	1	<1	0.01	0.04	0.01	6.0

Table 6

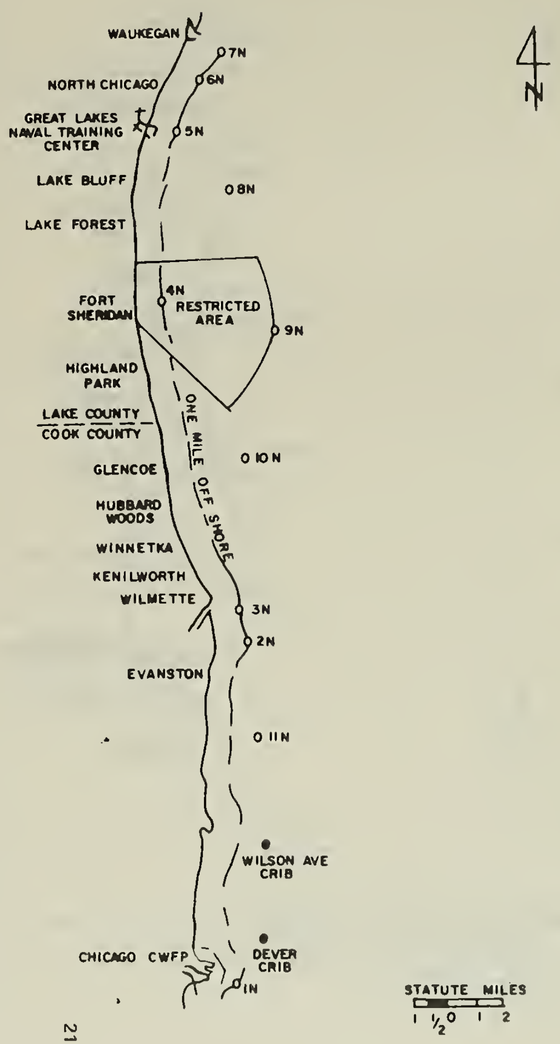
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE Feb. 23, 19 77



PARAMETER	STORET NUMBER	1N	2N	3N	4N	5N	6N	7N	8N	9N	10N	11N
TIME		0850	0950	0958								0929
TEMPERATURE °C	00010	1	1	1								1
pH	00400	8.3	8.3	8.3	FROZEN	FROZEN	FROZEN	FROZEN	FROZEN	FROZEN	FROZEN	8.3
TURBIDITY, FTU	00076	1.5	0.40	0.55								0.50
ODOR THRESHOLD	00086	2DM	1M	1M								2M
PHENOLS µg/l	32730	2	<1	1								1
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.01								0.04
PHOSPHATE, TOTAL mg/l	00650	0.04	0.04	0.04								0.05
PHOSPHATE, DISS. mg/l	00653	0.01	0.01	0.01								0.01
OXYGEN DEMAND, CHEMICAL	00340	18.7	23.2	21.4								12.5
PLATE COUNT 24 HRS, 35°C, PER ml	31751	1	0	0								0
MF-TC PER 100 ml	31503	0	0	0								0
MF-FC PER 100 ml	31616	0	0	0								0
MF-FS PER 100 ml	31679	0	0	0								0
PLANKTON PER ml	60050	1460	1420	1200								980
ACTINOS PER ml		0	0	0								0
FUNGI PER ml		2	0	0								0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	SE	SE	SE	SE	-	-	SR
VELOCITY	9	13	15	12	-	-	

SURVEY BY: MK, EB

REMARKS

Table 7

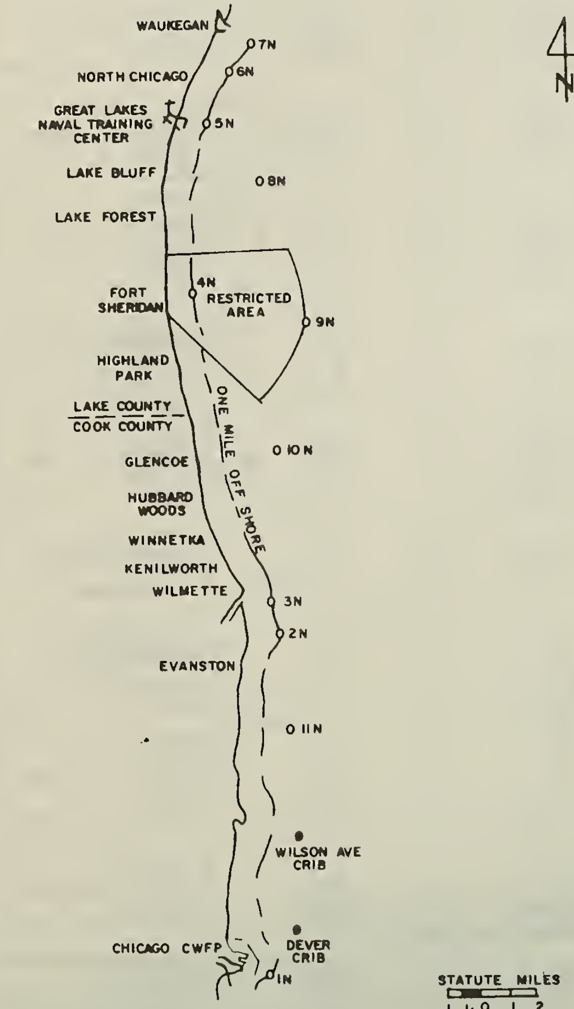
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE March 15, 19 77



PARAMETER	STORET NUMBER	1N	2N	3N	4N	5N	6N	7N	8N	9N	10N	11N
		SAMPLING POINTS										
TIME		0848	0946	0953		1114	1119	1128	1057	1034	1015	0928
TEMPERATURE °C	00010	6	4	4		8	8	9	3	3	3	5
pH	00400	8.3	8.3	8.3		8.4	8.4	8.4	8.4	8.4	8.3	8.3
TURBIDITY, FTU	00076	0.80	0.40	0.40		0.50	0.45	0.50	0.45	0.50	0.45	0.65
ODOR THRESHOLD	00086	2DM	2DF	2M		1M	2M	1M	2M	1M	2DM	2M
PHENOLS µg/l	32730	<1	<1	<1		1	<1	<1	<1	<1	<1	1
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.03
PHOSPHATE, TOTAL mg/l	00650	0.05	0.06	0.06		0.07	0.04	0.04	0.03	0.05	0.04	0.05
PHOSPHATE, DISS. mg/l	00653	0.03	0.03	0.02		0.04	0.01	0.01	0.02	0.04	0.02	0.01
OXYGEN DEMAND, CHEMICAL	00340	3.6	2.7	0.9		0.9	1.8	2.7	3.6	2.7	15.2	3.6
PLATE COUNT 24 HRS, 35°C, PER ml	31751	0	0	0		1	0	0	0	0	0	0
MF-TC PER 100 ml	31503	0	0	0		0	0	0	0	0	0	0
MF-FC PER 100 ml	31616	0	0	0		0	0	0	0	0	0	0
MF-FS PER 100 ml	31679	0	2	0		0	0	0	0	0	0	0
PLANKTON PER ml	60050	680	600	900		1060	360	160	600	1320	1120	760
ACTINOS PER ml.		0	0	0		0	0	0	0	0	0	0
FUNGI PER ml		0	1	0		0	0	1	1	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	S	SW	SW	SW	SW	SW	SW
VELOCITY	14	14	8	8	13	12	

SURVEY BY: RLM/JS

REMARKS:

Table 8

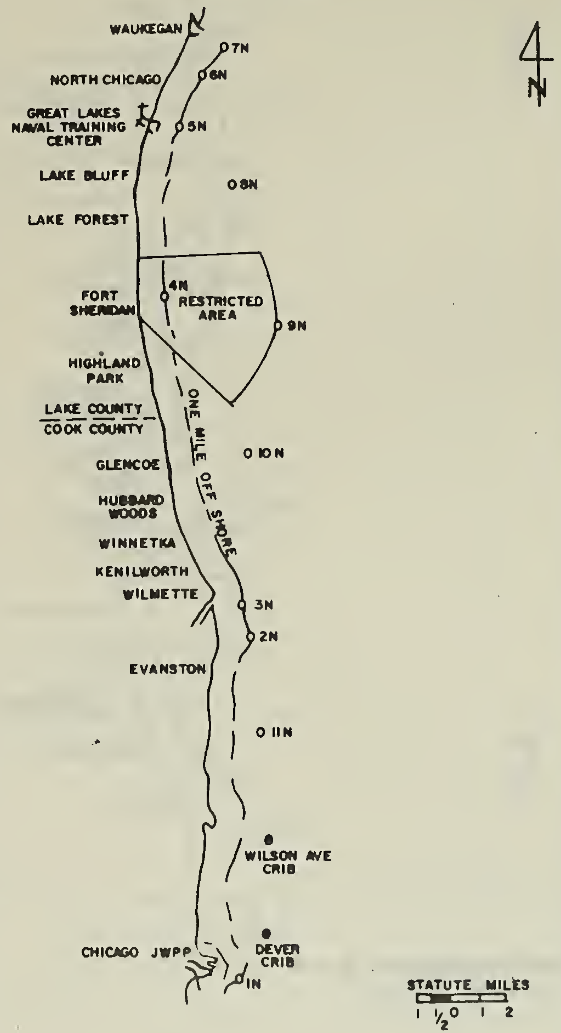
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE April 14, 1977



PARAMETER	STORET NUMBER	SAMPLING POINTS									
		1N	2N	3N	5N	6N	7N	8N	9N	10N	11N
TIME		0850	0950	0955	1120	1126	1133	1104	1041	1017	0926
TEMPERATURE °C	00010	9	7	7	6	6	6	6	5	6	8
pH	00400	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
TURBIDITY, FTU	00076	1.1	0.75	0.70	0.60	0.85	0.85	0.65	0.50	0.55	1.1
ODOR THRESHOLD	00086	2M	1M	2M	1M	1M	1M	1M	1M	10M	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	1	<1	<1	<1	1	<1
NITROGEN AMMONIA mg/l	00610	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PHOSPHATE, TOTAL mg/l	00650	0.07	0.05	0.03	0.04	0.03	0.07	0.04	0.09	0.08	0.02
PHOSPHATE, DISS. mg/l	00653	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.06	0.01
OXYGEN DEMAND, CHEMICAL	00340	9.6	4.8	3.9	4.8	6.7	11.5	7.7	11.5	8.7	11.5
PLATE COUNT 24 HRS, 35°C, PER ml	31751	16	0	0	1	0	1	3	6	1	0
MF-TC PER 100 ml	31503	0	0	0	0	0	0	0	0	0	0
MF-FC PER 100 ml	31616	0	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	0	0	0	0
PLANKTON PER ml.	60050	1300	940	780	NR	440	580	500	540	600	600
ACTINOS PER ml.		0	0	0	2	1	0	1	0	0	0
FUNGI PER ml		10	2	0	0	0	1	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	N	N	N	N	W	N	N
VELOCITY	5	5	4	2	2	3	

SURVEY BY MK / GS

REMARKS

Table 9

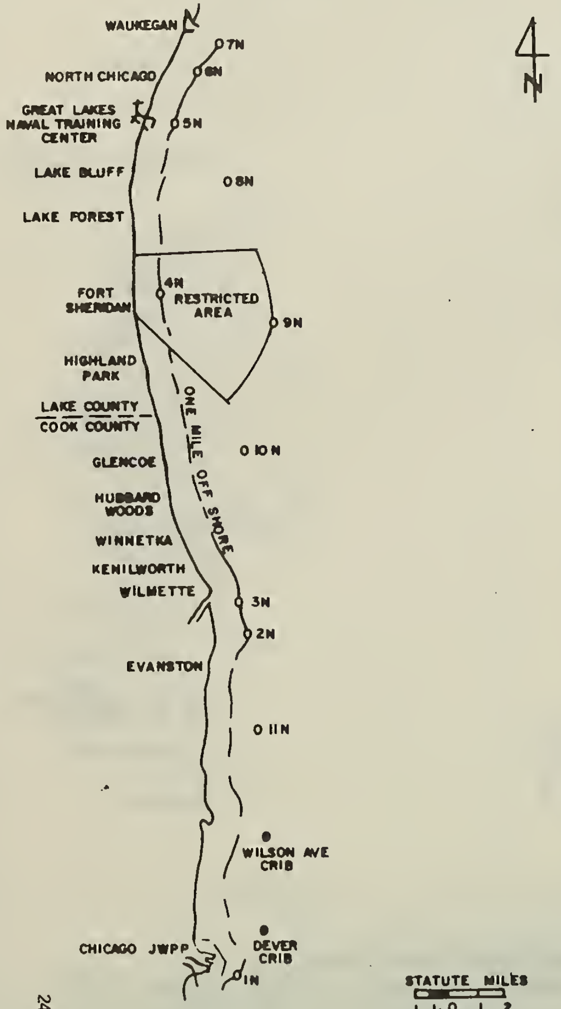
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE MAY 17, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1N	2N	3N	5N	6N	7N	8N	9N	10N	11N
TIME		0846	0949	0954	1114	1120	1130	1058	1035	1016	0929
TEMPERATURE °C	00010	13	13	11	13	12	12	13	13	12	12
pH	00400	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5
TURBIDITY, FTU	00076	0.85	0.75	0.70	0.70	0.70	0.65	0.65	0.50	0.60	0.65
ODOR THRESHOLD	00086	2DM	1M	1M	2M	1M	1M	2M	1M	2DM	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PHOSPHATE, TOTAL mg/l	00650	0.05	0.05	<0.01	0.10	0.05	0.02	<0.01	0.13	0.05	<0.01
PHOSPHATE, DISS. mg/l	00653	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	0.01	<0.01
OXYGEN DEMAND, CHEMICAL	00340	2.7	4.5	3.6	2.7	1.8	1.8	3.6	6.2	7.1	2.7
PLATE COUNT 24 HRS, 35°C, PER ml	31751	1	0	1	0	0	0	3	1	0	1
MF-TC PER 100 ml	31503	4	0	0	0	0	0	0	0	0	0
MF-FC PER 100 ml	31616	2	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	0	0	0	0
PLANKTON PER ml	60050	100	80	20	40	20	40	80	0	140	0
ACTINOS PER ml.		0	0	0	0	0	0	0	0	0	0
FUNGI PER ml		0	0	0	0	2	0	0	1	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	S	S	SE	SE	S	S	S
VELOCITY	7	8	6	5	11	12	

SURVEY BY: MK / JS

REMARKS:

Table 10.

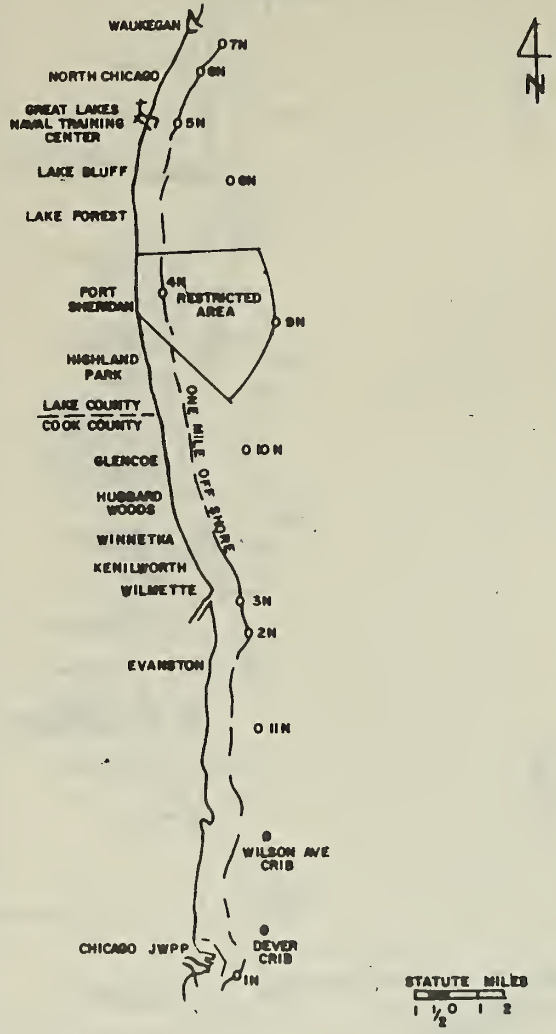
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE JUNE 16, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1N	2N	3N	5N	6N	7N	8N	9N	10N	11N
TIME		0848	0951	0957	1123	1130	1137	1101	1038	1019	0930
TEMPERATURE °C	00010	15	15	15	14	15	16.5	12	11	13	14
pH	00400	8.4	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5
TURBIDITY, FTU	00076	1.5	0.50	1.2	0.50	0.80	0.90	0.30	0.30	0.35	0.35
ODOR THRESHOLD	00086	3Df	2Df	2DM	1M	1M	1M	2M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
PHOSPHATE, TOTAL mg/l	00650	0.06	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.04	0.11
PHOSPHATE, DISS. mg/l	00653	0.04	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.01
OXYGEN DEMAND, CHEMICAL	00340	3.9	5.9	2.0	5.9	6.9	8.8	5.9	3.9	2.9	2.0
PLATE COUNT 24 HRS, 35°C, PER ml	31751	10	0	4	3	4	13	0	0	1	0
MF-TC PER 100 ml.	31503	8	0	0	0	0	0	0	0	0	0
MF-FC PER 100 ml.	31616	0	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	0	0	0	0
PLANKTON PER ml.	60050	-	-	-	-	-	-	-	-	-	-
ACTINOS PER ml.		0	0	0	0	0	0	0	0	0	0
FUNGI PER ml.		0	0	0	1	0	1	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300 / 1400	PREVAILING WIND
DIRECTION	SE	SE	S	SW	SW	SW/SW	SW
VELOCITY	5	4	4	6	6	6	

SURVEY BY: MK / JS

REMARKS:

Table 11.

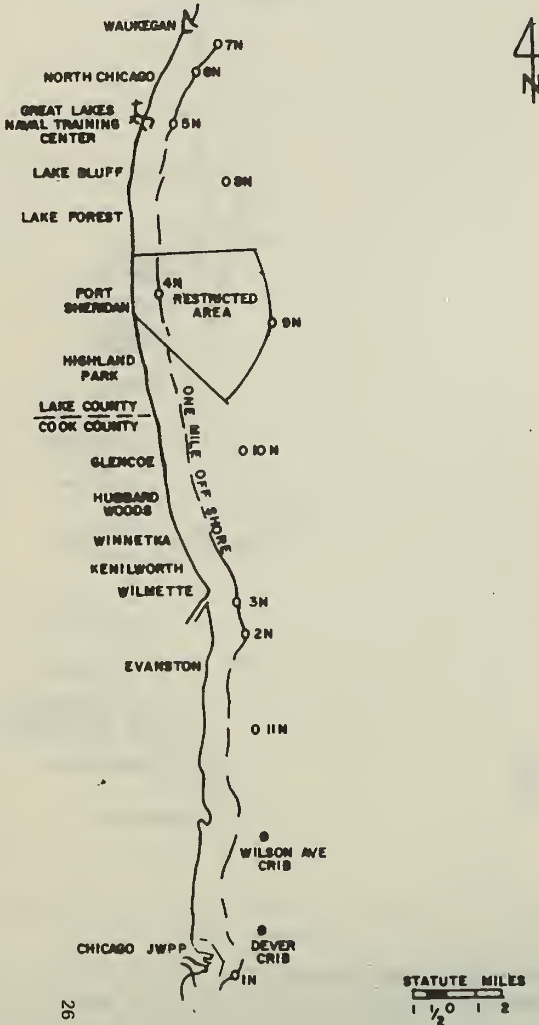
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE JULY 7, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1N	2N	3N	5N	6N	7N	8N	9N	10N	11N	
TIME		0857	0958	1004	1118	1125	1132	1103	1040	1021	0938	
TEMPERATURE °C	00010	18	18	18	18	17	17	18	18	19	18	
pH	00400	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.6	8.6	8.6	
TURBIDITY, FTU	00076	0.65	0.40	0.35	0.35	0.40	0.35	0.40	0.30	0.35	0.55	
ODOR THRESHOLD	00086	2Df	1Df	1M	1M	1M	1M	1M	1M	1DM	1Df	
PHENOLS µg/l	32730	<1	<1	1	<1	<1	<1	<1	<1	<1	1	
NITROGEN AMMONIA mg/l	00610	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	
PHOSPHATE, TOTAL mg/l	00650	0.06	0.05	0.03	0.03	0.06	0.02	0.06	0.06	0.06	0.05	
PHOSPHATE, DISS. mg/l	00653	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	
OXYGEN DEMAND, CHEMICAL	00340	15.2	11.2	11.4	13.3	14.3	15.2	11.4	11.4	21.0	8.6	
PLATE COUNT 24 HRS, 35°C, PER ml	31751	14	3	1	0	0	0	0	0	0	0	
MF-TC PER 100 ml	31503	0	0	0	0	0	0	0	0	0	0	
MF-FC PER 100 ml	31616	0	0	0	0	0	0	0	0	0	0	
MF-FS PER 100 ml	31679	0	0	0	0	0	0	0	0	0	0	
PLANKTON PER ml	60050	1200	20	140	140	180	40	40	0	400	600	
ACTINOS PER ml		0	1	0	0	0	0	0	0	0	0	
FUNGI PER ml		0	0	1	0	0	0	0	0	0	0	

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300/1400	PREVAILING WIND
DIRECTION	NE	E	S	S	SE	W / NW	Variable
VELOCITY	2	2	2	4	2	5 / 6	

SURVEY BY: MK & JS

REMARKS:

Table 12.

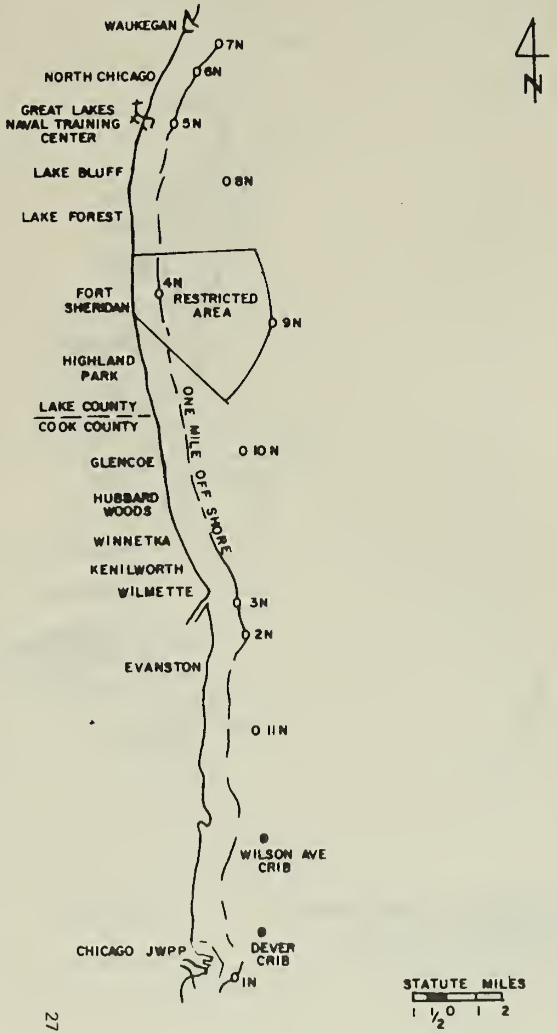
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE AUG. 16, 19 77



PARAMETER	STORET NUMBER	IN	2N	3N	5N	6N	7N	8N	9N	10N	11N
		SAMPLING POINTS									
TIME		0845	0947	0953	1115	1122	1129	1055	1032	1013	0926
TEMPERATURE °C	00010	20	18	18	16	16	16	18	19	17	18
pH	00400	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
TURBIDITY, FTU	00076	0.60	0.55	0.55	0.45	0.40	0.40	0.40	0.40	0.50	0.55
ODOR THRESHOLD	00086	IM	IM	IMG	IM	IM	IM	IM	IM	IM	IM
PHENOLS µg/l	32730	<1	<1	<1	<1	1	<1	1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
PHOSPHATE, TOTAL mg/l	00650	0.03	0.02	0.03	0.04	0.01	0.03	0.15	0.02	0.02	0.01
PHOSPHATE, DISS mg/l	00653	0.02	<0.01	0.02	0.03	0.01	<0.01	0.09	<0.01	0.01	<0.01
OXYGEN DEMAND, CHEMICAL	00340	4.4	4.4	5.3	5.3	4.4	6.2	5.3	6.2	4.4	5.3
Plate Count 24 hrs, 35 C PER ml.	31751	-	-	-	-	-	-	-	-	-	-
PLATE COUNT 48 HRS, 35°C, PER ml	31751	120	14	17	0	4	20	4	2	4	31
MF-TC PER 100 ml	31503	12	24	24	0	0	0	8	0	32	4
MF-FC PER 100 ml	31616	2	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml	31679	6	0	0	2	0	0	0	0	0	2
PLANKTON PER ml	60050	540	500	740	700	360	500	400	220	380	300
ACTINOS PER ml		1	1	0	0	0	0	0	0	0	0
FUNGI PER ml		0	3	0	0	1	0	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	S	SW	SW	SW	W	W	SW
VELOCITY	9	8	9	8	10	10	

SURVEY BY MK / GS

REMARKS

Table 13.

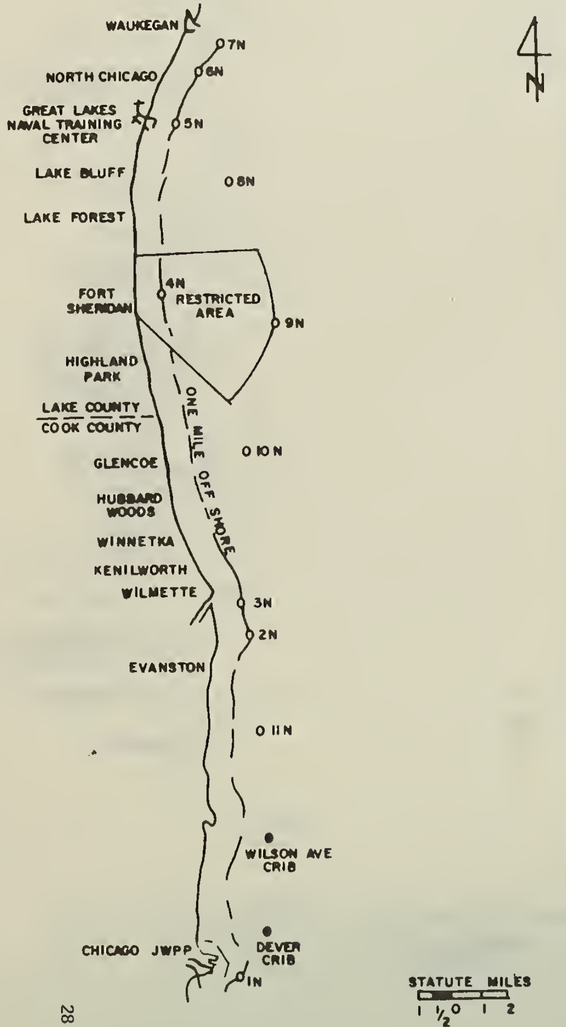
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE OCT. 4, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1N	2N	3N	5N	6N	7N	8N	9N	10N	11N
TIME		0910	1015	1022	1144	1151	1159	1126	1103	1044	0952
TEMPERATURE °C	00010	13	13	13	14	14	14	14	14	13	13
pH	00400	8.4	8.4	8.4	8.5	8.5	8.4	8.5	8.5	8.5	8.4
TURBIDITY, FTU	00076	17	2.3	2.0	1.6	2.0	7.5	0.85	0.70	0.95	2.9
ODOR THRESHOLD	00086	1M	1M	2DM	1M	1M	1M	2M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.05	0.05	0.03	0.03	0.03	0.07	0.01	0.06	0.03	0.03
PHOSPHATE, TOTAL mg/l	00650	0.09	0.22	0.19	0.05	0.11	0.18	0.09	0.11	0.04	0.02
PHOSPHATE DISS mg/l	00653	0.05	0.11	0.07	0.04	0.05	0.07	0.03	0.07	0.04	0.02
OXYGEN DEMAND, CHEMICAL	00340	14.2	4.4	5.3	12.4	2.7	5.3	5.3	10.6	1.8	0.9
Plant Count 24 hrs. 35 C Per/ml	31751	11	2	0	4	1	1	1	2	3	5
PLATE COUNT 48 HRS, 35°C, PER ml		450	24	35	26	24	72	15	16	42	220
MF-TC PER 100 ml	31503	204	20	40	4	8	80	0	12	12	108
MF-FC PER 100 ml	31616	20	0	0	0	0	2	0	0	0	0
MF-FS PER 100 ml	31679	36	0	0	0	0	0	0	0	0	0
PLANKTON PER ml	60050	360	260	60	260	380	460	340	40	80	440
ACTINOS PER ml.		5	0	0	0	0	2	0	0	0	0
FUNGI PER ml		5	0	0	0	1	0	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	W	W	W	W	S	S	W
VELOCITY	9	7	5	3	4	7	

SURVEY BY: G.S.

REMARKS

Table 14.

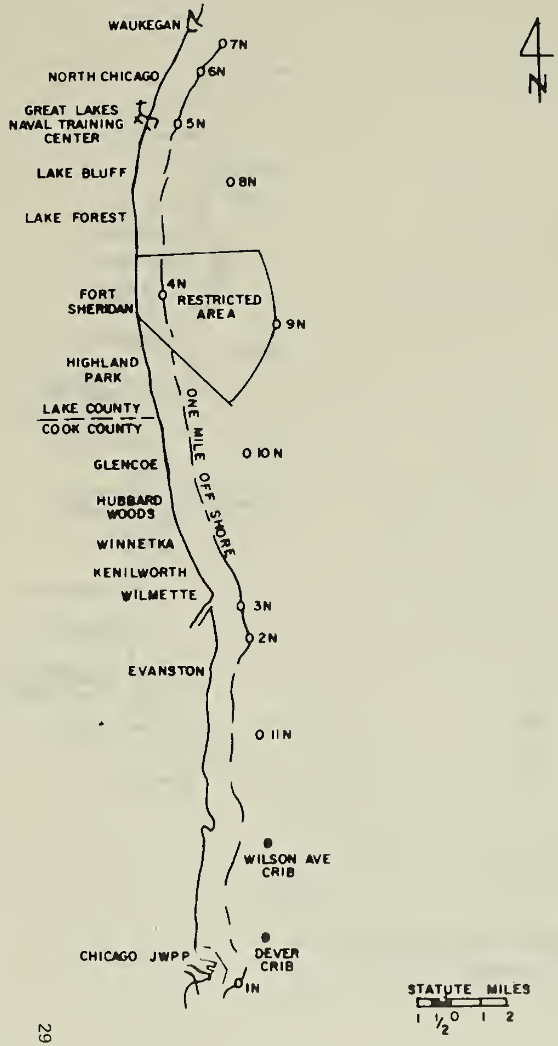
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE NOVEMBER 17, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS IN*	2N	3N	5N	6N	7N	8N	9N	10N	11N
TIME		0845	0944	0952	1106	1113		1056	1033	1014	0926
TEMPERATURE °C	00010	9	8	9	9	8	9	10	9	9	8
pH	00400		8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
TURBIDITY, FTU	00076		2.8	1.4	0.60	0.75	0.85	0.55	0.55	0.65	2.0
ODOR THRESHOLD	00086		2M	1M	1M	1M	1M	1M	1M	1M	1M
PHENOLS µg/l	32730		<1	<1	<1	<1	<1	<1	<1	<1	1
NITROGEN AMMONIA mg/l	00610		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PHOSPHATE, TOTAL mg/l	00650		0.09	0.06	0.09	0.20	0.32	0.06	0.15	0.28	0.06
PHOSPHATE, DISS. mg/l	00653		0.06	0.03	0.04	0.18	0.28	0.13	0.10	0.18	0.03
OXYGEN DEMAND, CHEMICAL	00340		7.7	5.8	1.1	1.3	8.6	8.6	1.3	5.8	7.7
PLATE COUNT 24 HRS, 35°C, PER ml	31751										
MF-TC PER 100 ml	31503										
MF-FC PER 100 ml	31616										
MF-FS PER 100 ml	31679										
PLANKTON PER ml	60050										
ACTINOS PER ml.											
FUNGI PER ml											

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	SW	SW	SW	SW	SW	SW	SW
VELOCITY	10	9	10	15	11	13	

SURVEY BY
M. Kniahynycky. E. Evangilista

REMARKS

* Sample IN Contaminated with gascline from bottle in Chem Unit

Table 14 (con'td)

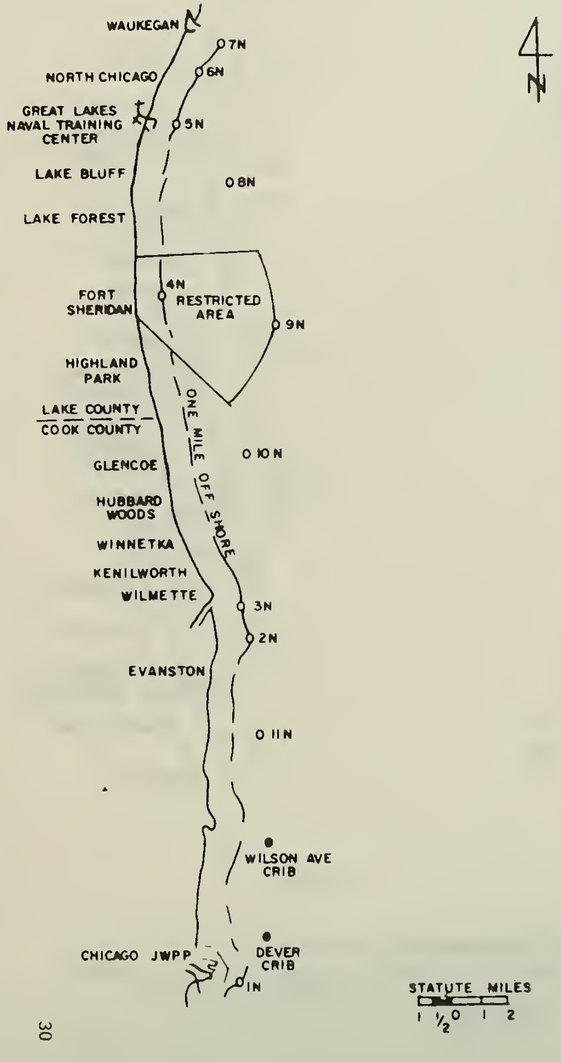
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

NORTH SHORE LAKE SURVEY

DATE NOVEMBER 17, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1N	2N	3N	5N	6N	7N	8N	9N	10N	11N	
TIME												
TEMPERATURE °C	00010											
Chloride			10.0	10.2	9.6	9.6	9.4	9.8	9.6	9.8	10.0	
Conductivity			285	280	275	280	280	280	275	280	285	
Non-Filtrable Residue			12	23	32	8	10	3	3	1	16	
Sulfate			20.9	21.9	21.9	21.7	23.3	23.0	23.2	23.3	24.8	
Nitrate-Nrite			0.158	0.165	0.200	0.185	0.175	0.194	0.195	0.190	0.157	
Organic Nitrogen			0.12	0.12	0.12	0.20	0.16	0.04	0.16	0.12	0.16	
PHOSPHATE DISS. mg/l	00653											
OXYGEN DEMAND, CHEMICAL	00340											
Plate Count 24 hrs. 35 C Per ml	31751	3	5	6	2	10	6	7	2	1	2	
PLATE COUNT 48 HRS, 35°C, PER ml	31751	80	23	12	4	12	11	22	14	12	2	
MF-TC PER 100 ml	31503	4	4	12	0	0	0	0	0	0	4	
MF-FC PER 100 ml	31616	2	4	0	0	0	0	2	0	0	0	
MF-FS PER 100 ml	31679	0	0	0	0	0	0	0	0	0	0	
PLANKTON PER ml	60050	820	1000	600	80	320	220	80	340	320	720	
ACTINOS PER ml		0	0	0	0	0	0	0	0	0	0	
FUNGI PER ml		1	3	1	0	2	1	1	0	0	0	

METEOROLOGICAL DATA

							PREVAILING WIND
TIME							
DIRECTION							
VELOCITY							

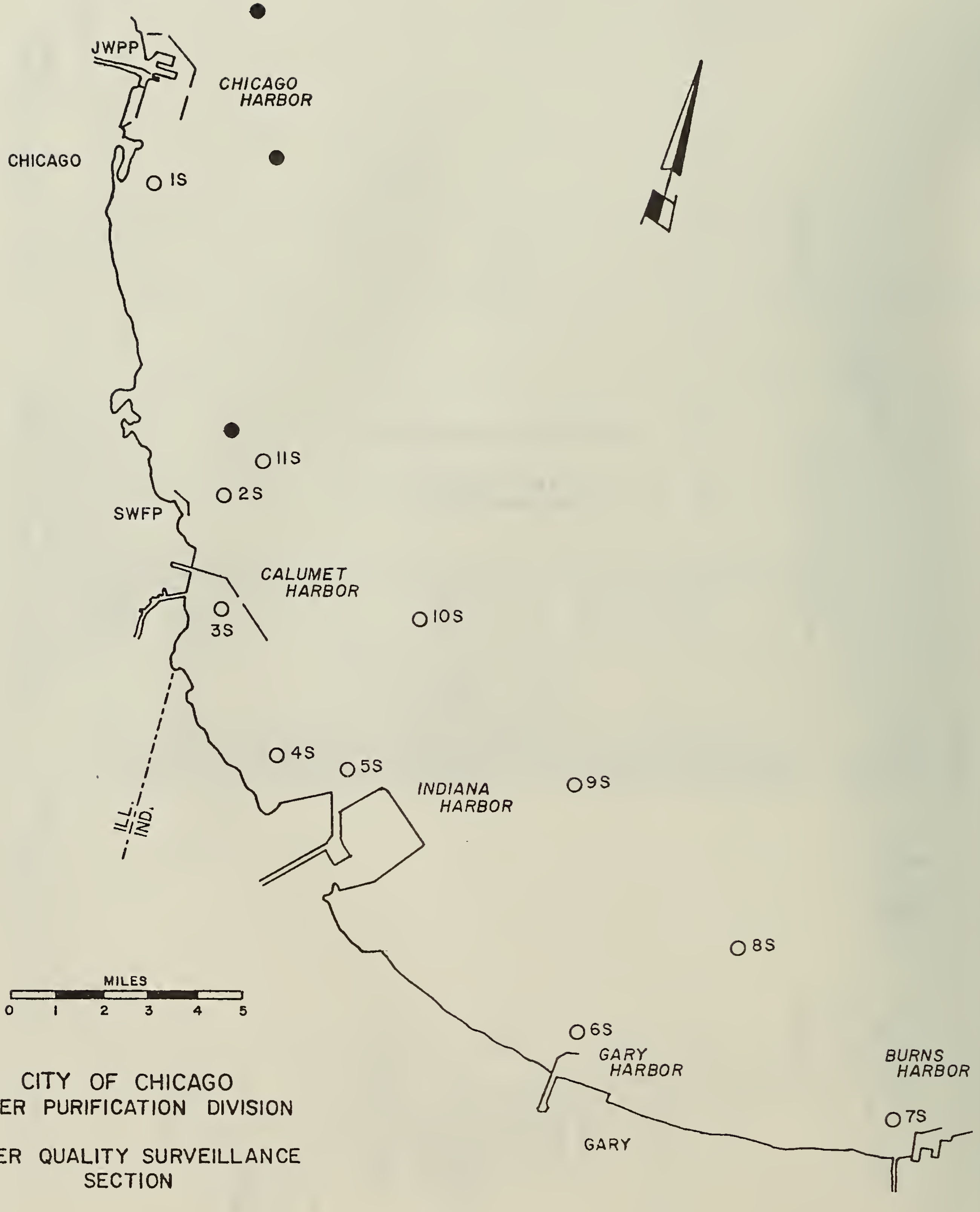
SURVEY BY

REMARKS

Section B (Continued)

Lake Michigan
2. South Shore Lake Survey

LAKE MICHIGAN
SOUTH SHORE LAKE SURVEY
Figure 7.



CITY OF CHICAGO
WATER PURIFICATION DIVISION

WATER QUALITY SURVEILLANCE
SECTION

MK

SOUTH SHORE LAKE SURVEY

The South Shore Lake Survey consists of 11 points numbered 1S through 11S between Chicago's Burnham Park Harbor and Burns Harbor, Indiana, just east of Gary. Points 1S through 7S are within one mile of shore and are strongly influenced by shore discharges. Points 8S through 11S are from two to six miles offshore and measure the indirect effects of these discharges on the lake proper.

The shore in the vicinity of this survey consists of one of the most concentrated industrial areas in the nation with a predominance of petroleum and steel manufacturing complexes. The area is drained by three primary streams, all of which connect directly with the lake. These are the Indiana Harbor Canal, the Calumet River and Burns Ditch.

The Indiana Harbor Canal is the main source of pollution in the area, carrying effluents from municipal sewage treatment plants, steel mills and oil refineries. Over 90% of the water in the Canal originates from sewers as treated waste water, cooling water or storm water overflow. Water from the Canal often flows northward as a plume, causing episodes of degraded quality water at Chicago's South Water Filtration Plant and requiring additional water treatment to remove tastes and odors.

The Grand Calumet River normally flows away from the lake but may flow into the lake during heavy rains. However, flow just at the north of the river is usually outward due to discharges and polluted Calumet Harbor water is carried into the lake.

Burns Ditch discharges into Lake Michigan through Burns Harbor and drains the Little Calumet River, which is heavily influenced by sewer discharges.

Microbiological Quality

Graphs for total and fecal coliform levels over the past four years are presented on the following pages. Full microbiological data obtained in 1977 is summarized in the Microbiological Analyses Summary Table following the graphs.

Bacterial pollution along the south shore continues to be quite high at near-shore locations in the Calumet and Indiana Harbor areas. Offshore locations (points 8S-11S) generally contained lower coliform levels, as expected, but levels at these locations were strongly influenced by behavior of shore discharges determined by wind conditions immediately prior to sample collection. In particular, point 10S located 4 miles off the Indiana Harbor Canal, showed elevated coliform levels for 1977 due to high counts obtained on March 8 and September 13. The elevated levels were due to south-southwest winds during the previous 36 hours carrying polluted Indiana Harbor Canal water into the area.

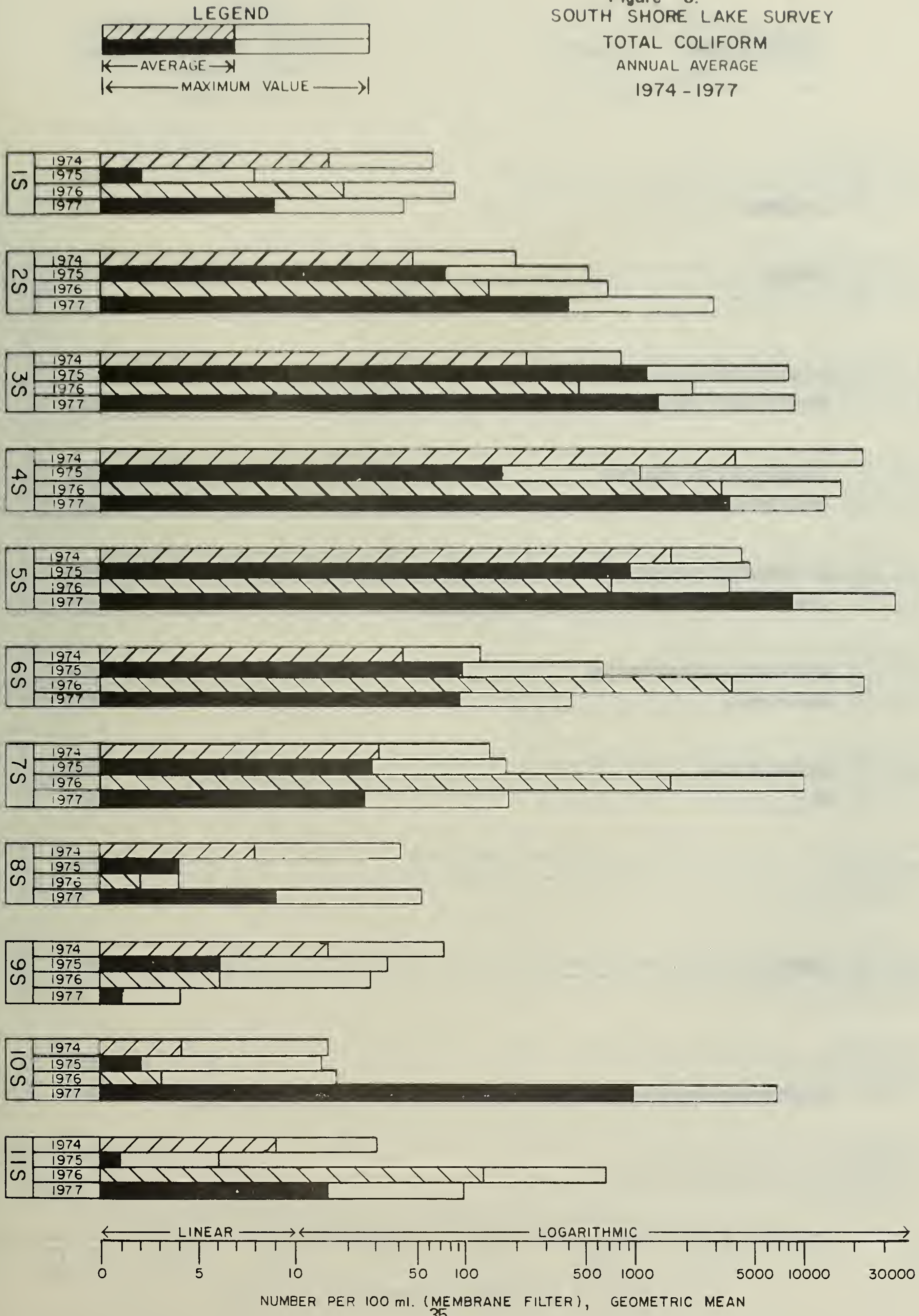
Results of algae analyses are presented in the Algae Summary Table. Diatoms continue to be the most frequently observed algal group.

Chemical Quality

Graphs of total phosphate and ammonia nitrogen levels for the last four years follow the graphs for coliform.

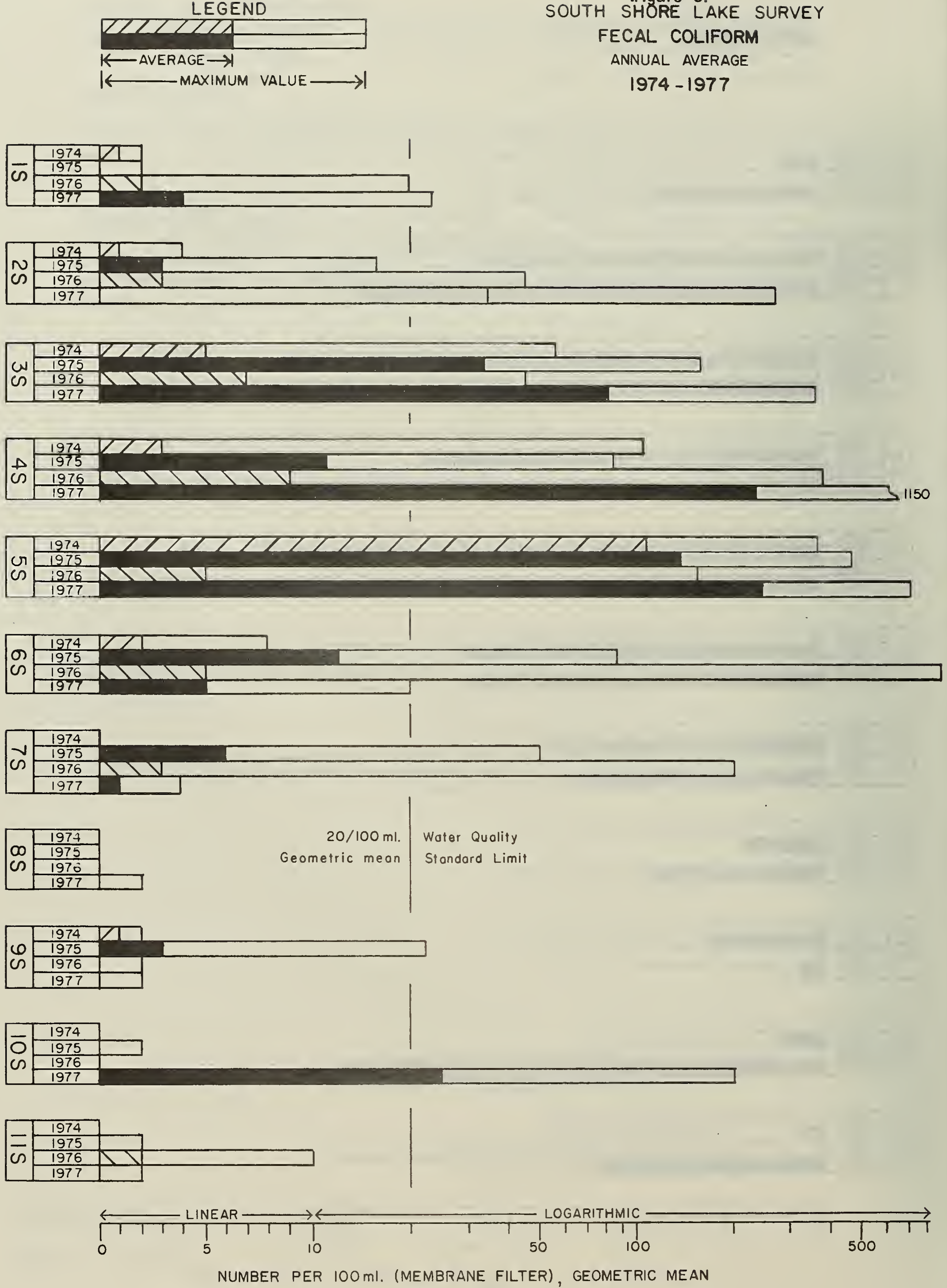
Total phosphate levels remain quite high with all point averages exceeding the standard limit of 0.02 mg/l. Ammonia nitrogen average levels have decreased in the past few years for most points with only 3 points in excess of the standard limit of 0.02 mg/l. Point 5S off the Indiana Harbor Canal continues to have the highest ammonia nitrogen levels.

Figure 8.
SOUTH SHORE LAKE SURVEY
TOTAL COLIFORM
ANNUAL AVERAGE
1974 - 1977



WATER QUALITY SURVEILLANCE SECTION

Figure 9.
SOUTH SHORE LAKE SURVEY
FECAL COLIFORM
ANNUAL AVERAGE
1974 - 1977



WATER QUALITY SURVEILLANCE SECTION

Figure 10.
SOUTH SHORE LAKE SURVEY
AMMONIA NITROGEN
ANNUAL AVERAGE
1974 - 1977

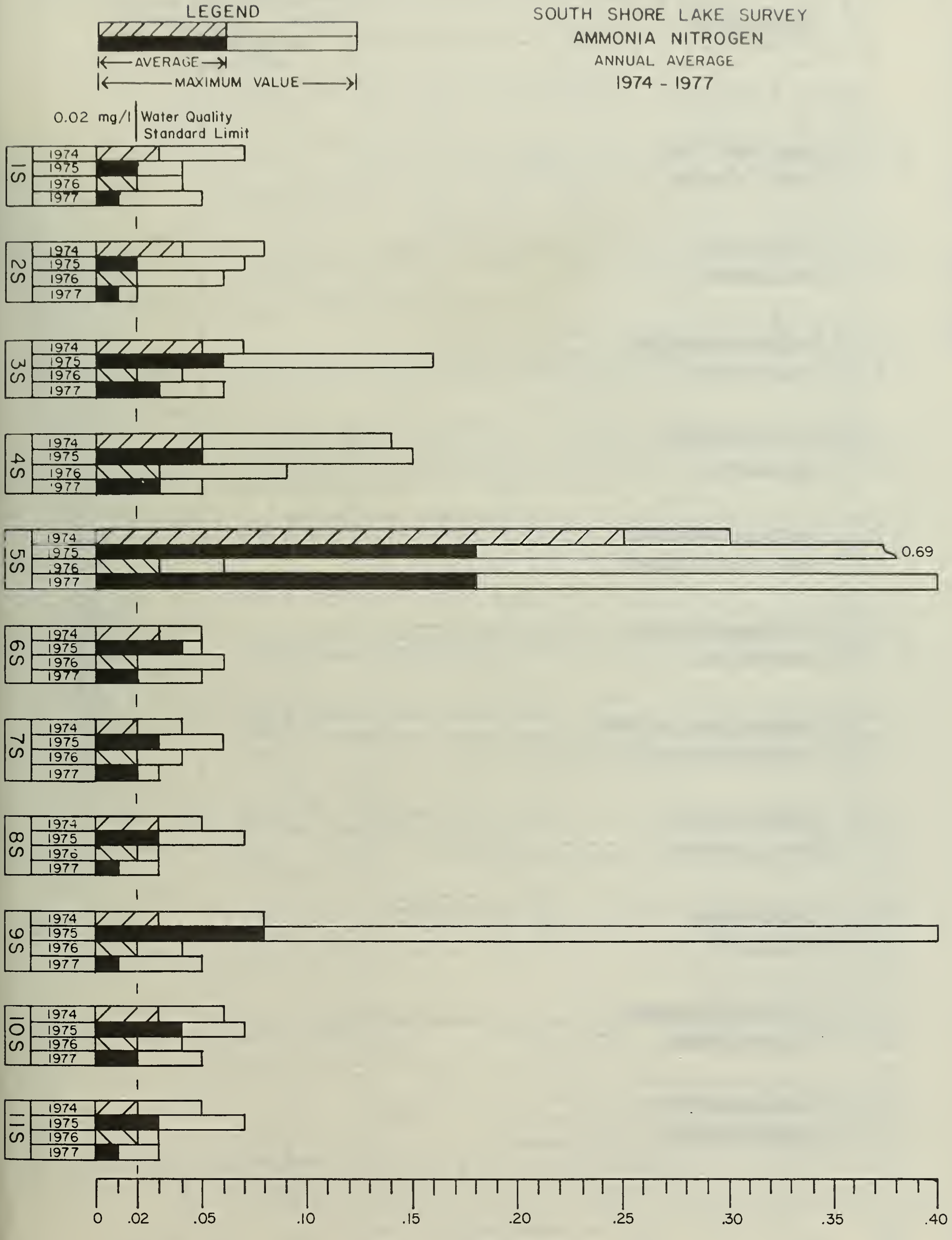


FIGURE 11.
SOUTH SHORE LAKE SURVEY
TOTAL PHOSPHATE
ANNUAL AVERAGE
1974 - 1977

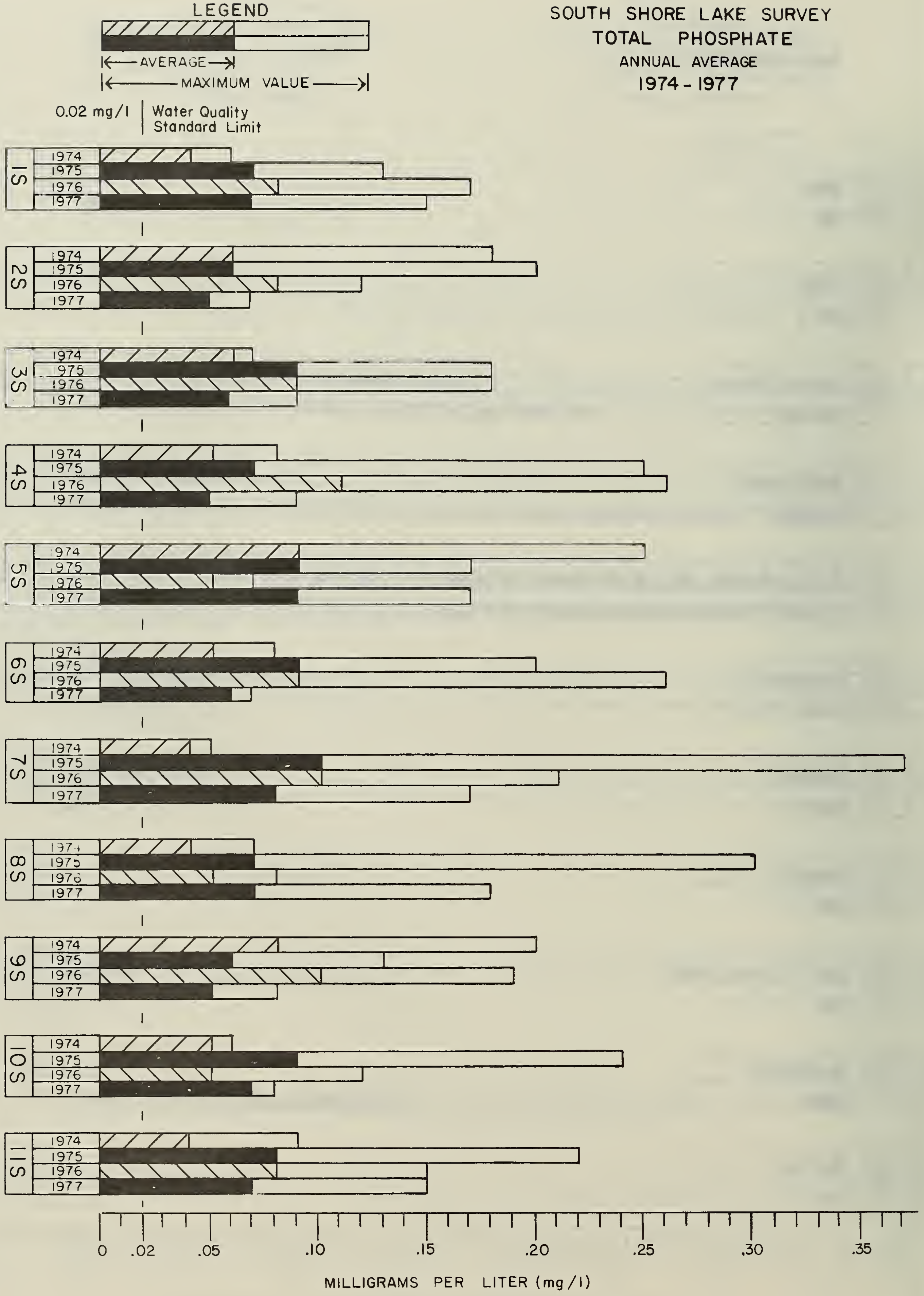


Table 15.

SOUTH SHORE LAKE SURVEY
COMPARISON TABLE
1971-1977

PARAMETER	YEAR	1 S		2 S		3 S		4 S		5 S		6 S		7 S		8 S		9 S		10 S		11 S	
		MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.
TOTAL COLIFORM M.F. NO./100ml.	1971	120	55	300	109	320	187	5000	1727	8,100	2,464	156	67	194	57	48	20	90	23	34	[illegible]	[illegible]	24
	1972	62	20	66	25	1,240	444	208	101	8,000	2,108	112	33	36	18	84	20	12	5	80	19	92	24
	1973	8,000	1,661	1,600	503	13,000	3,384	15,000	4,321	15,000	3,522	188	104	152	51	36	10	244	86	42	10	18	8
	1974	64	16	192	48	810	227	22,000	3771	4200	1,672	128	42	140	30	42	8	76	15	16	4	30	9
	1975	8	2	530	79	8,000	1,110	1,040	167	4,700	915	640	92	180	28	4	0	34	5	14	2	6	1
	1976	84	19	700	135	2,350	464	17,000	3,194	3,650	706	21,000	3,588	10,000	1,679	4	2	28	6	18	3	680	125
	1977	42	9	2,900	392	8,600	1,281	15,000	3,285	32,000	8,215	400	89	182	24	52	9	6	1	6,800	902	96	15
FECAL COLIFORM M.F. NO./100ml.	1971	2	1	34	3	48	11	640	71	480	93	60	5	50	3	16	2	2	1	2	1	8	2
	1972	0	0	0	0	108	10	52	7	194	18	10	2	2	1	2	1	4	1	24	2	2	1
	1973	24	2	4	1	198	9	180	8	186	12	2	1	0	0	0	0	0	0	0	0	2	1
	1974	2	1	4	1	56	5	104	3	360	102	8	2	0	0	0	0	2	1	0	0	0	0
	1975	2	0	16	3	165	34	82	11	460	134	88	12	50	6	0	0	22	3	2	0	2	0
	1976	20	2	46	3	46	7	380	9	152	5	870	5	200	3	0	0	0	0	0	0	10	2
	1977	24	2	276	2	360	14	1,150	36	700	95	20	2	4	1	2	0	2	1	200	2	2	0
NITROGEN AMMONIA mg/l	1971	0.15	0.06	0.14	0.06	0.15	0.08	0.08	0.05	0.49	0.23	0.05	0.04	0.08	0.05	0.05	0.04	0.13	0.05	0.04	0.03	0.06	0.04
	1972	0.09	0.05	0.09	0.05	0.15	0.07	0.14	0.09	0.59	0.24	0.09	0.06	0.06	0.03	0.06	0.03	0.10	0.05	0.17	0.08	0.08	0.05
	1973	0.06	0.03	0.06	0.03	0.14	0.05	0.11	0.06	0.23	0.09	0.05	0.03	0.04	0.03	0.14	0.04	0.04	0.03	0.05	0.03	0.04	0.03
	1974	0.07	0.03	0.08	0.04	0.07	0.05	0.14	0.05	0.30	0.25	0.05	0.03	0.04	0.02	0.05	0.03	0.08	0.03	0.06	0.03	0.05	0.02
	1975	0.04	0.02	0.07	0.02	0.16	0.06	0.15	0.05	0.69	0.18	0.05	0.04	0.06	0.03	0.07	0.03	0.40	0.08	0.07	0.04	0.07	0.03
	1976	0.04	0.02	0.06	0.02	0.04	0.02	0.09	0.03	0.06	0.03	0.06	0.02	0.04	0.02	0.03	0.02	0.04	0.02	0.04	0.02	0.03	0.02
	1977	0.05	0.01	0.02	0.01	0.06	0.03	0.05	0.03	0.40	0.18	0.05	0.02	0.03	0.02	0.03	0.01	0.05	0.01	0.05	0.02	0.03	0.01
PHOSPHATE TOTAL mg/l	1971	0.08	0.05	0.07	0.04	0.08	0.04	0.21	0.07	0.14	0.07	0.06	0.03	0.07	0.04	0.10	0.04	0.21	0.06	0.03	0.02	0.03	0.02
	1972	0.07	0.05	0.10	0.07	0.13	0.07	0.07	0.05	0.20	0.08	0.10	0.05	0.15	0.08	0.08	0.06	0.15	0.07	0.05	0.03	0.07	0.04
	1973	0.26	0.09	0.27	0.09	0.28	0.11	0.28	0.09	0.29	0.10	0.29	0.11	0.31	0.10	0.30	0.09	0.30	0.10	0.30	0.10	0.30	0.10
	1974	0.06	0.04	0.18	0.06	0.07	0.06	0.08	0.05	0.25	0.09	0.08	0.05	0.05	0.04	0.07	0.04	0.20	0.08	0.06	0.05	0.09	0.04
	1975	0.13	0.07	0.20	0.06	0.18	0.09	0.25	0.07	0.17	0.09	0.20	0.09	0.37	0.10	0.30	0.07	0.13	0.06	0.24	0.09	0.22	0.08
	1976	0.17	0.08	0.12	0.08	0.18	0.09	0.26	0.11	0.07	0.05	0.26	0.09	0.21	0.10	0.08	0.05	0.19	0.10	0.12	0.05	0.15	0.08
	1977	0.15	0.07	0.07	0.05	0.09	0.06	0.09	0.05	0.17	0.09	0.07	0.06	0.17	0.08	0.18	0.07	0.08	0.05	0.08	0.07	0.15	0.07

NOTE: FECAL COLIFORM AVG. IS GEOMETRIC MEAN

Table 16.

SOUTH SHORE LAKE SURVEY
1977
MICROBIOLOGICAL ANALYSES SUMMARY TABLE

8 SURVEYS		PLATE COUNT PER ml. 24 HR. 35° C	TOTAL COLIFORM PER 100 ml. M.F.	FECAL COLIFORM PER 100 ml. M.F.	FECAL STREP PER 100 ml. M. F.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml.
STORET NO.		31751	31503	31616	31679	60050		
1 S	MAX.	20	42	24	0	1,200	2	2
	AVG.	6	9	2	0	473	0	0
2 S	MAX.	1,800	2,900	276	4	720	3	2
	AVG.	240	392	2	1	454	1	1
3 S	MAX.	9,600	8,600	360	50	1,740	0	2
	AVG.	1,353	1,281	14	7	805	0	0
4 S	MAX.	2,700	15,000	1,150	2	2,120	4	1
	AVG.	658	3,285	36	1	714	1	0
5 S	MAX.	84,000	32,000	700	108	2,140	3	1
	AVG.	18,426	8,215	95	28	890	1	0
6 S	MAX.	550	400	20	0	880	1	1
	AVG.	144	89	2	0	440	0	0
7 S	MAX.	43	182	4	0	1,680	0	2
	AVG.	11	24	1	0	715	0	0
8 S	MAX.	12	52	2	0	880	1	2
	AVG.	5	9	0	0	506	0	1
9 S	MAX.	30	6	2	0	1,060	1	1
	AVG.	7	1	1	0	440	0	0
10 S	MAX.	1,900	6,800	200	4	780	0	3
	AVG.	380	902	2	1	386	0	1
11 S	MAX.	94	96	2	0	1,340	0	1
	AVG.	26	15	0	0	450	0	0

NOTE: FECAL COLIFORM AVG. IS GEOMETRIC MEAN

WATER QUALITY SURVEILLANCE SECTION

Table 17.

SOUTH SHORE LAKE SURVEY
ALGAE SUMMARY TABLE

ORGANISMS PER ML.

1977

	SURVEY DATE	MAR. 8	APR. 7	MAY 3	JUNE 21	AUG. 9	SEPT. 13	OCT. 13	NOV. 29	
1 S	DIATOMS	320 SnM	520 FA	400 MSn	280 AT		40 T	40 T	780 T	
	FLAGELLATES									
	GREENS								60 M	
	BLUE-GREENS	200 O				420 AgA	140 A	20 A	340 OC	
2 S	DIATOMS	500 FA	440 FM	600 TSn	100 SR			NO SAMPLE	420 TN	
	FLAGELLATES		20 E		360 D					
	GREENS									
	BLUE-GREENS			60 O	60 O	180 AG	140 A		300 O	
3 S	DIATOMS	1,520 FSn	480 FA	1,320 FTM	760 FT		180 T	1,160 FT	340 TN	
	FLAGELLATES	20 P		40 D			20 E		240 D	
	GREENS									
	BLUE-GREENS	200 O				60 AG			100 GC	
4 S	DIATOMS	2,120 FSn	920 AT	360 SnN	280 TA	20 N	320 T	NO SAMPLE	340 TN	
	FLAGELLATES									
	GREENS			20 O		140 A				
	BLUE-GREENS				100 O	260 AG			120 GC	
5 S	DIATOMS	1,000 FSn	860 FT	220 TN	760 FA	20 N	240 T	2,140 FT	420 TS	
	FLAGELLATES						20 E			
	GREENS	20 Cl		40 A						
	BLUE-GREENS				1,120 D	140 A			100 GC	
6 S	DIATOMS	660 FA	500 AF	420 SnM	180 A			NO SAMPLE	840 TF	
	FLAGELLATES						20 E			
	GREENS			40 A						
	BLUE-GREENS	200 O				180 AG			40 C	
7 S	DIATOMS	940 FSn	560 FT	500 FSn	420 FA		320 T	800 TF	480 TA	
	FLAGELLATES	40 P		20 D	1,200 D	20 C			40 D	
	GREENS							20 P		
	BLUE-GREENS				60 O	40 AG			40 C	
8 S	DIATOMS	740 FA	720 FT	380 SnT	500 FSn			NO SAMPLE	740 FT	
	FLAGELLATES									
	GREENS									
	BLUE-GREENS	140 O		40 O		200 AG				
9 S	DIATOMS	560 AF	360 MT	60 SNSn	160 AF			800 FA	1,060 TA	
	FLAGELLATES				120 D	200 D				
	GREENS									
	BLUE-GREENS					60 A	140 A			
10 S	DIATOMS	540 AF	140 FSn	440 SnN	300 AS	140 A	40 Sn	NO SAMPLE	540 TS	
	FLAGELLATES			20 D						
	GREENS									
	BLUE-GREENS		180 O			120 AG			240 O	
11 S	DIATOMS	380 SM	220 TN	820 FSn	120 RSn			1,300 TF	500 TNz	
	FLAGELLATES	20 P		20 P						
	GREENS									
	BLUE-GREENS					160 A		40 A	20 C	

NOTE: LETTERS DESIGNATE SPECIFIC GENERA IN ORDER OF ABUNDANCE, SEE KEY ON FOLLOWING PAGE.

KEY TO ALGAE SUMMARY TABLES

The following genera are specified by the letters used in the tables;

DIATOM algal group

A - Asterionella
Am - Ampiphora
C - Cyclotella
Cb - Cymbella
Ct - Cymatopleura
D - Diatoma
F - Fragilaria
M - Melosira
N - Navicula
Nz - Nitzschia
R - Rhizosolenia
S - Stephanodiscus
Sn - Synedra
T - Tabellaria

FLAGELLATE algal group

C - Ceratium
Cl - Chlamydomonas
D - Dinobryon
E - Euglena
G - Gymnodinium
M - Mallomonas
P - Peridinium
S - Synura
V - Volvox

GREEN algal group

A - Ankistrodesmus
C - Cosmarium
Cd - Cladophera
Cl - Closterium
Co - Coelastrum
M - Mougeotia
Mc - Micractinium
O - Oocystis
Od - Oedogonium
P - Pediastrum
S - Scenedesmus

BLUE - GREEN algal group

A - Anacystis
Ag - Agmenellum
An - Anabaena
C - Chroococcus
G - Gomphospheria
L - Lyngbia
M - Microcystis
O - Oscillatoria

Table 8.

SOUTH SHORE LAKE SURVEY
1977
CHEMICAL ANALYSES SUMMARY TABLE

8 SURVEYS		pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS mg/l	NITROGEN AMMONIA mg/l	PHOSPHATE TOTAL mg/l	PHOSPHATE DISSOLVED mg/l	OXYGEN DEMAND CHEMICAL
STORET NO.		00400	00076	00086	32730	00610	00650	00653	00340
1S	MAX.	8.5	4.00	3Df	<1	0.05	0.15	0.06	15.4
	AVG.	8.4	1.28	2	<1	0.01	0.07	0.03	6.4
2S	MAX.	8.5	1.50	2Df	1	0.02	0.07	0.06	16.1
	AVG.	8.4	1.13	1	<1	0.01	0.05	0.02	8.6
3S	MAX.	8.5	2.80	2Mm	2	0.06	0.09	0.06	12.9
	AVG.	8.4	1.39	2	<1	0.03	0.06	0.03	7.7
4S	MAX.	8.5	3.50	4Ch	1	0.05	0.09	0.04	19.2
	AVG.	8.4	1.36	2	<1	0.03	0.05	0.01	7.6
5S	MAX.	8.6	2.80	3Ch	2	0.40	0.17	0.06	14.0
	AVG.	8.4	1.82	2	1	0.18	0.09	0.04	7.8
6S	MAX.	8.5	2.40	2MG	2	0.05	0.07	0.05	11.5
	AVG.	8.4	1.09	1	1	0.02	0.06	0.03	7.2
7S	MAX.	8.6	2.20	1Df	1	0.03	0.17	0.10	8.6
	AVG.	8.4	0.90	1	<1	0.02	0.08	0.04	5.0
8S	MAX.	8.6	2.50	2MG	<1	0.03	0.18	0.05	12.9
	AVG.	8.4	0.86	1	<1	0.01	0.07	0.03	6.7
9S	MAX.	8.6	3.40	2MG	1	0.05	0.08	0.03	10.8
	AVG.	8.4	0.83	1	<1	0.01	0.05	0.02	7.2
10S	MAX.	8.5	2.60	2MG	1	0.05	0.08	0.04	11.8
	AVG.	8.4	0.81	1	<1	0.02	0.07	0.02	6.0
11S	MAX.	8.6	2.50	2MG	1	0.03	0.15	0.07	17.2
	AVG.	8.5	0.85	1	<1	0.01	0.07	0.03	8.8

WATER QUALITY SURVEILLANCE SECTION

Table 19.

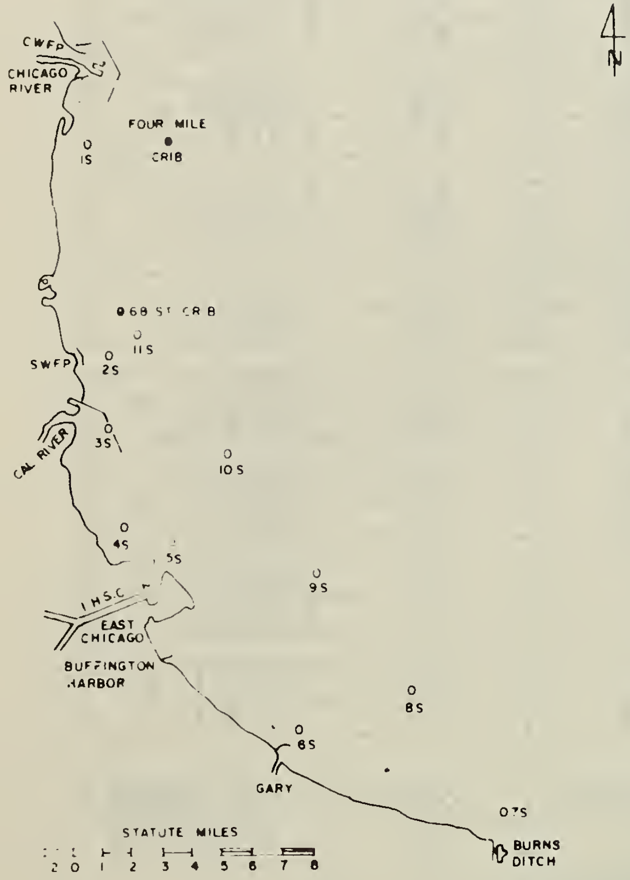
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE March 8, 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0850	0927	0942	0959	1008	1040	1114	1134	1154	1214	1234
TEMPERATURE °C	00010	1	2	3	3	2	2	2	2	2	3	2
pH	00400	8.3	8.3	8.3	8.3	8.2	8.3	8.3	8.3	8.3	8.3	8.3
TURBIDITY FTU	00076	0.50	0.95	0.90	1.0	1.5	0.65	0.50	0.35	0.25	0.60	0.35
ODOR THRESHOLD	00086	2M	1M	2M	1M	2Ch	2DM	1M	1M	1M	1M	1M
PHENOLS µg/l	32730	<1	1	2	1	2	<1	1	<1	1	1	1
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.06	0.03	0.30	0.01	0.01	0.01	0.01	0.03	0.01
PHOSPHATE, TOTAL mg/l	00650	0.09	0.07	0.04	0.04	0.07	0.06	0.06	0.18	0.04	0.07	0.04
PHOSPHATE DISS mg/l	00653	0.06	0.04	0.04	0.04	0.06	0.03	0.06	0.05	0.02	0.04	0.04
OXYGEN DEMAND, CHEMICAL	00340	1.8	6.2	5.4	6.2	6.2	8.0	0.9	1.8	10.7	6.2	1.8
PLATE COUNT 24 HRS, 35°C PER ml	31751	0	0	67	10	29000	0	1	1	0	1100	0
MF-TC PER 100 ml	31503	0	0	62	400	7300	4	8	0	0	400	0
MF-FC PER 100 ml	31616	0	0	0	0	700	0	0	0	0	4	0
MF FS PER 100 ml	31679	0	0	0	0	108	0	0	0	0	0	0
PLANKTON PER ml	60050	720	500	1740	2120	1020	860	1000	880	560	540	400
ACTINOS PER ml		0	0	0	0	1	1	0	0	0	0	0
FUNGI PER ml		0	0	0	0	0	0	0	1	1	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	SW	SW	S	S	S	S	S
VELOCITY	14	9	10	10	9	10	

SURVEY BY M.K. & J.S.

REMARKS

Table 20.

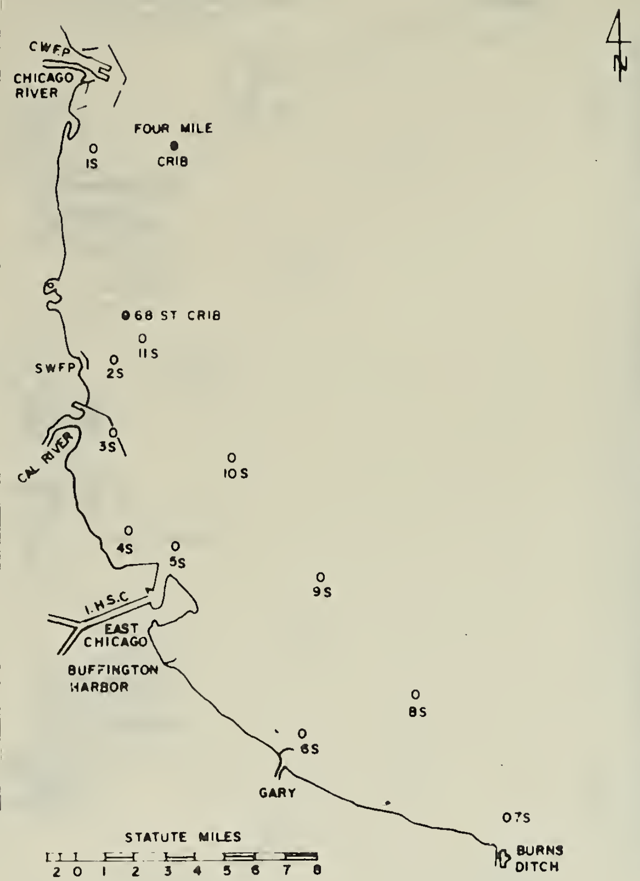
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE April 7, 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0907	0943	0954	1010	1018	1050	1129	1149	1209	1229	1249
TEMPERATURE °C	00010	7	7	8	8	7	7	6	6	5	6	6
pH	00400	8.4	8.5	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.5	8.5
TURBIDITY FTU	00076	1.1	1.3	1.2	1.1	1.3	1.1	0.95	0.70	0.60	0.65	0.80
ODOR THRESHOLD	00086	2MG	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM
PHENOLS µg/l	32730	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.01	0.02	0.03	0.03	0.01	0.05	0.02	0.01	0.01	0.01	0.01
PHOSPHATE, TOTAL mg/l	00650	0.02	0.03	0.05	0.06	0.08	0.07	0.03	0.06	0.02	0.07	0.07
PHOSPHATE DISS mg/l	00653	0.01	0.01	0.02	0.02	0.06	0.03	0.01	0.02	0.01	0.02	0.02
OXYGEN DEMAND, CHEMICAL	00340	15.4	9.6	7.7	19.2	7.7	11.5	4.8	4.8	5.8	5.8	8.7
PLATE COUNT 24 HRS, 35°C, PER ml	31751	0	1	30	5	11	28	5	9	17	24	31
MF-TC PER 100 ml	31503	0	6	60	88	30	182	128	0	0	0	0
MF-FC PER 100 ml	31616	0	0	6	0	0	0	4	0	0	0	0
MF FS PER 100 ml	31679	0	0	0	0	0	0	0	0	0	4	0
PLANKTON PER ml	60050	520	460	480	920	860	500	560	720	360	320	220
ACTINOS PER ml		0	0	0	0	0	0	0	0	0	0	0
FUNGI PER ml		0	1	0	0	0	0	0	2	0	1	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	SW	W	W	W	NW	NE	W
VELOCITY	10	12	9	6	7	5	

SURVEY BY
M. Kniahynycky, G. Slowik

REMARKS

Table 21.

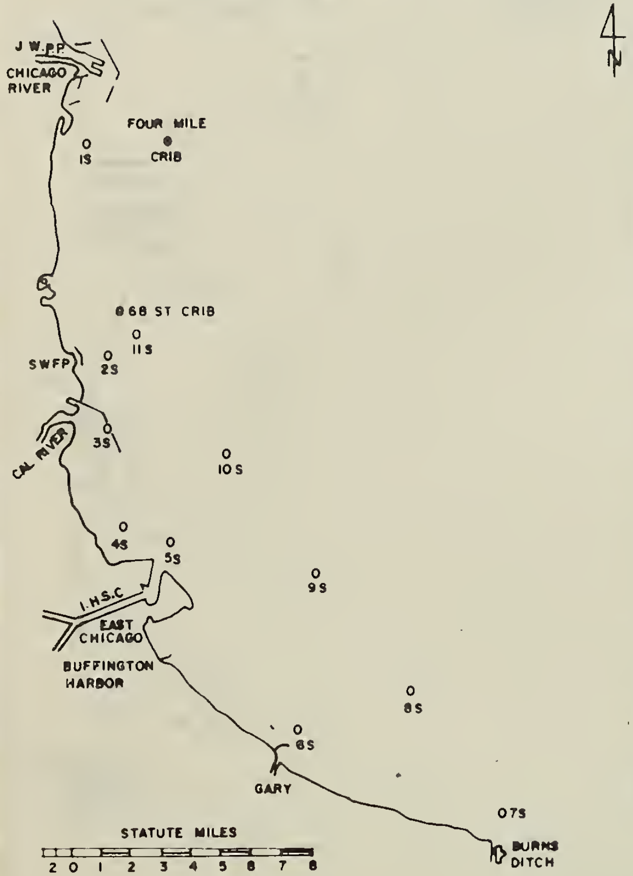
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE May 3, 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0852	0928	0940	0957	1006	1040	1112	1132	1152	1212	1232
TEMPERATURE °C	00010	9	9	10	10	12	10	10	9	9	9	9
pH	00400	8.3	8.3	8.3	8.3	8.2	8.3	8.3	8.4	8.4	8.4	8.4
TURBIDITY, FTU	00076	1.1	1.2	1.3	1.3	1.9	1.0	0.95	0.80	0.75	0.70	1.0
ODOR THRESHOLD	00086	2DM	1M	2M	1M	3Ch	1M	1M	1M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	1	<1	1	2	<1	<1	<1	<1	1
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.02	0.03	0.40	0.04	0.02	0.01	0.02	0.01	0.01
PHOSPHATE, TOTAL mg/l	00650	0.09	0.05	0.07	0.03	0.09	0.07	0.12	0.06	0.06	0.07	0.07
PHOSPHATE DISS mg/l	00653	0.03	0.02	0.02	0.01	0.05	0.03	0.03	0.02	0.01	0.01	0.03
OXYGEN DEMAND, CHEMICAL	00340	3.1	7.6	6.2	5.4	7.0	7.8	7.0	5.4	4.7	7.8	9.3
PLATE COUNT 24 HRS, 35°C, PER ml	31751	20	1	190	350	15000	550	43	9	30	4	0
MF-TC PER 100 ml	31503	0	0	178	94	270	64	4	0	0	0	0
MF-FC PER 100 ml	31616	0	0	0	16	118	0	0	0	0	0	0
MF-FS PER 100 ml	31679	0	0	0	0	12	0	0	0	0	0	0
PLANKTON PER ml	60050	400	660	1360	380	260	460	520	420	60	460	840
ACTINOS PER ml		0	0	0	0	0	0	0	1	0	0	0
FUNGI PER ml		0	0	0	0	0	0	2	0	1	0	1

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	N	E	E	E	N	N	E
VELOCITY	4	9	8	6	2	2	

SURVEY BY MK - JS

REMARKS

Table 22.

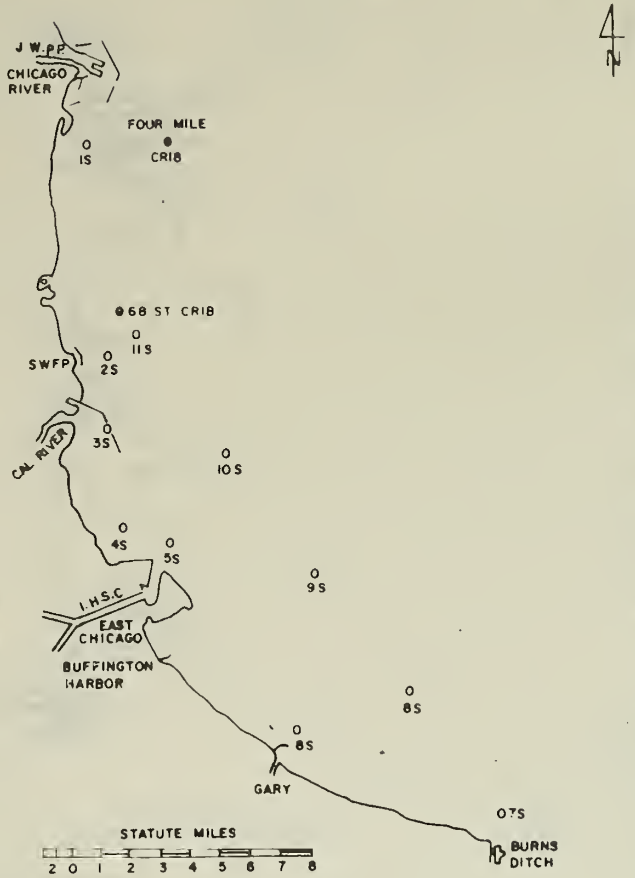
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE JUNE 21. 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS										
		1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
TIME		0902	0936	0948	1005	1013	1051	1121	1140	1200	1220	1240
TEMPERATURE °C	00010	16	17	17	18	18	17	18	18	17	16	17
pH	00400	8.5	8.5	8.5	8.5	8.6	8.5	8.6	8.6	8.6	8.5	8.6
TURBIDITY FTU	00076	0.50	0.45	1.2	0.65	2.8	0.60	0.50	0.50	0.25	0.30	0.45
ODOR THRESHOLD	00086	3Df	2Df	2Df	2Df	3Ch	1Df	1Df	1M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	<0.01	<0.01	<0.01	<0.01	0.3	0.03	0.03	0.03	0.01	0.02	<0.01
PHOSPHATE, TOTAL mg/l	00650	0.11	0.07	0.07	0.03	0.17	0.05	0.17	0.08	0.06	0.08	0.08
PHOSPHATE DISS mg/l	00653	0.04	0.06	0.04	0.02	0.06	0.04	0.10	0.05	0.03	0.04	0.04
OXYGEN DEMAND, CHEMICAL	00340	6.8	9.7	8.7	4.9	9.7	3.9	5.8	2.9	2.9	2.9	7.8
PLATE COUNT 24 HRS, 35°C, PER ml	31751	1	0	22	61	13000	15	20	2	0	0	2
MF-TC PER 100 ml	31503	0	0	8	188	1920	12	0	2	0	0	2
MF-FC PER 100 ml	31616	2	0	10	174	172	12	2	0	0	0	2
MF-FS PER 100 ml	31679	0	0	0	0	2	0	0	0	0	0	0
PLANKTON PER ml	60050	280	520	760	380	1900	180	1680	580	280	300	120
ACTINOS PER ml		0	0	0	0	0	0	0	0	0	0	0
FUNGI PER ml		0	1	0	0	0	0	0	0	0	2	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	NW	N	N	NE	NE	NE	N
VELOCITY	2	2	2	2	4	4	

SURVEY BY MK/JS

REMARKS

Table 22.

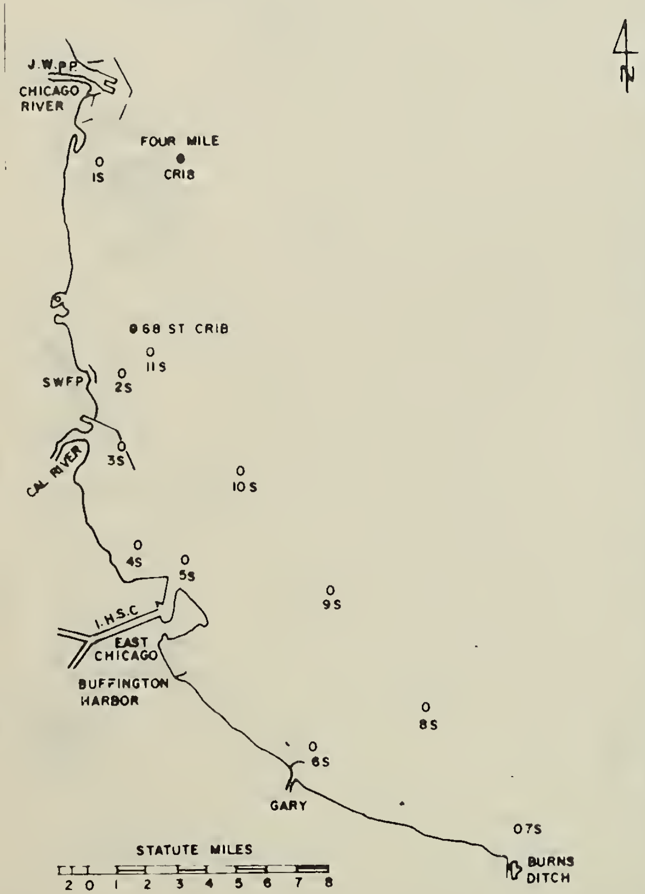
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE AUGUST 9, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
TIME		0915	0951	1005	1018	1029	1105	1140	1200	1220	1240	1300
TEMPERATURE °C	00010	20	21	20	21	22	21	22	21	21	21	21
pH	00400	8.4	8.4	8.4	8.4	8.3	8.4	8.5	8.6	8.6	8.5	8.6
TURBIDITY, FTU	00076	0.40	0.40	0.65	0.50	1.2	0.45	0.30	0.30	0.30	0.35	0.40
ODOR THRESHOLD	00086	1DM	1M	2M	2M	2Ch	1M	1M	1M	1M	1M	1M
PHENOLS μg/l	32730	<1	<1	<1	<1	2	2	<1	<1	<1	<1	1
NITROGEN AMMONIA mg/l	00610	<0.01	0.01	0.01	0.01	0.30*	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PHOSPHATE, TOTAL mg/l	00650	0.05	0.03	0.03	0.03	0.11	0.06	0.01	0.02	0.03	0.03	0.04
PHOSPHATE DISS mg/l	00653	0.03	0.01	0.01	0.01	0.05	0.05	0.01	0.01	0.02	0.01	0.01
OXYGEN DEMAND, CHEMICAL	00340	4.4	3.5	4.4	0.9	4.4	7.0	3.5	9.7	6.2	0.9	13.2
Plate Count 24 hrs. 35 C PER ml	31751	7	110	9600	380	84000*	460	5	2	0	11	75
PLATE COUNT 48 HRS, 35°C, PER ml		27	200	16800	2900	198000	1360	31	10	2	100	460
MF-TC PER 100 ml	31503	0	36	8600	128	32000	32	0	0	0	0	2
MF-FC PER 100 ml	31616	0	0	134	20	170	0	0	0	0	0	0
MF FS PER 100 ml	31679	0	0	50	0	80	0	0	0	0	0	0
PLANKTON PER ml	60050	420	180	60	420	160	180	60	200	260	260	160
ACTINOS PER ml		0	0	0	1	0	0	0	0	0	0	0
FUNGI PER ml		0	0	0	1	0	1	0	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	SE	SE	SE	SE	SE	SE	SE
VELOCITY	1	4	4	6	7	4	

SURVEY BY RLM / JS

REMARKS

* Checked

Table 24.

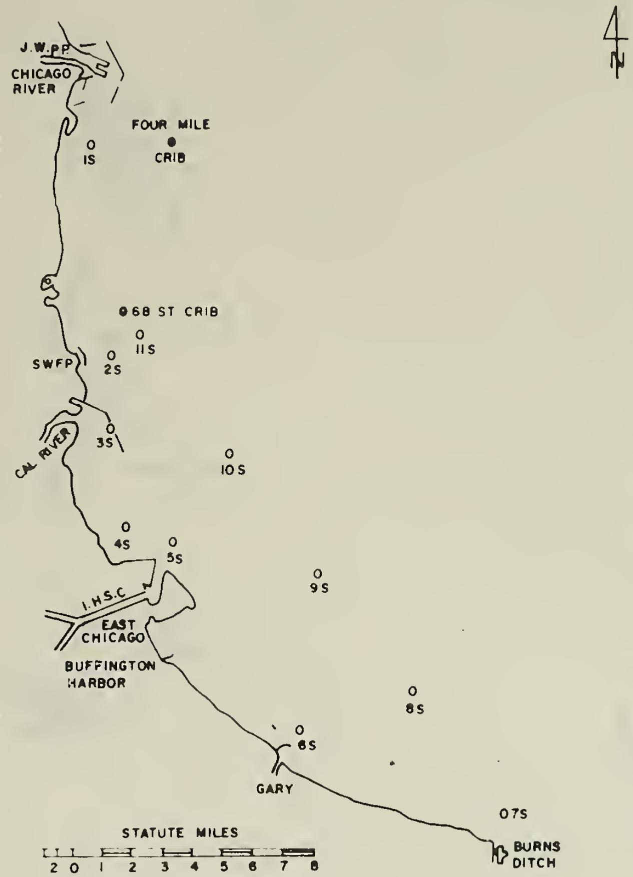
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE SEPT. 13. 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0851	0932	0944	1000	1008	1045	1120	1140	1200	1220	1250
TEMPERATURE °C	00010	18	19	20	19	19	19	19	18	18	18	18
pH	00400	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5
TURBIDITY FTU	00076	0.55	0.60	0.80	0.50	0.55	0.50	0.50	0.45	0.40	0.60	0.45
ODOR THRESHOLD	00086	2Df	1Df	1M	2Ch	3Ch	1M	1M	1M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.05	0.01	0.03	0.05	0.03	0.01	0.02	0.01	0.05	0.05	0.03
PHOSPHATE, TOTAL mg/l	00650	0.01	0.01	0.07	0.03	0.03	0.04	0.04	0.08	0.02	0.01	0.01
PHOSPHATE DISS mg/l	00653	<0.01	0.01	0.06	<0.01	<0.01	0.03	0.03	0.02	0.01	<0.01	<0.01
OXYGEN DEMAND, CHEMICAL	00340	6.5	16.1	12.9	10.8	14.0	7.5	8.6	12.9	10.8	11.8	17.2
Plate Count 24 hrs. 35 C PER ml	31751	18	1800	770	2700	2200	58	12	4	7	1900	94
PLATE COUNT 48 HRS, 35°C, PER ml		100	3800	1600	4500	5800	320	57	14	57	3600	330
MF-TC PER 100 ml	31503	42	2900	1020	8900	9100	14	12	14	6	6800	560
MF-FC PER 100 ml	31616	24	276	360	1150	392	4	2	0	2	200	96
MF FS PER 100 ml	31679	0	0	0	2	2	0	0	0	0	2	0
PLANKTON PER ml	60050	180	140	200	320	260	20	320	0	140	40	0
ACTINOS PER ml		0	3	0	4	3	0	0	0	1	0	0
FUNGI PER ml		2	1	0	1	1	1	0	2	0	1	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	NW	N	N	NW	N	N	N
VELOCITY	5	4	4	6	10	12	

SURVEY BY M. Knianycky & G. Slowik

REMARKS

Table 25.

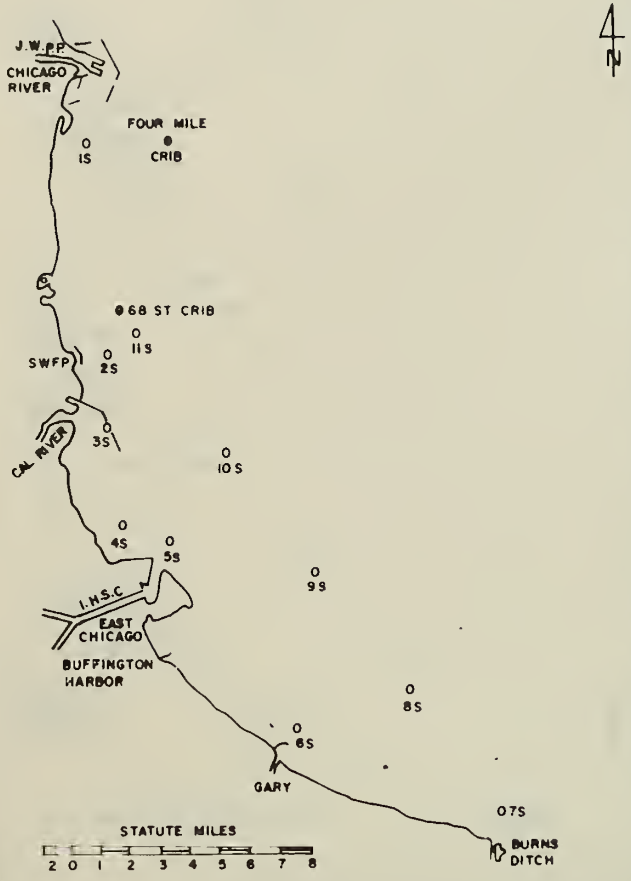
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE OCT. 13, 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0857	0934	0945	1002	1007	1046	1118	1140	1202	1224	1250
TEMPERATURE °C	00010	11	12	12	12	12	12	12	12	12	12	12
pH	00400	8.4	8.5	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5
TURBIDITY FTU	00076	2.1	1.5	2.3	2.3	2.2	1.9	1.3	1.3	0.70	0.70	0.85
ODOR THRESHOLD	00086	2MG	2MG	2Mm	4Ch	3Ch	2MG	2MG	2MG	2MG	2MG	2MG
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.00	0.00	0.04	0.04	0.08	0.04	0.03	0.02	0.00	0.04	0.00
PHOSPHATE, TOTAL mg/l	00650	0.15	0.07	0.09	0.09	0.07	0.07	0.12	0.05	0.08	0.04	0.15
PHOSPHATE DISS mg/l	00653	0.01	0.01	0.04	0.01	0.03	0.04	0.08	0.03	0.01	0.03	0.07
OXYGEN DEMAND, CHEMICAL	00340	7.1	8.8	8.8	8.0	8.0	6.2	4.4	10.6	9.7	8.0	8.0
Plate Count 24 hrs. 35 C PER ml	31751	0	5	140	1100	1400	42	0	12	2	0	0
PLATE COUNT 48 HRS, 35°C, PER ml		16	41	500	2400	2900	290	12	34	6	10	10
MF-TC PER 100 ml	31503	24	128	200	15000	8900	400	36	52	0	12	20
MF-FC PER 100 ml	31616	4	4	132	420	20	20	0	2	2	0	0
MF-FS PER 100 ml	31679	0	0	0	2	2	0	0	0	0	0	0
PLANKTON PER ml	60050	60	-	1160	-	2140	-	820	-	800	-	1340
ACTINOS PER ml		0	0	0	0	0	0	0	0	0	0	0
FUNGI PER ml		0	2	1	0	0	0	0	0	0	0	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	W	S	S	S	SE	S	S
VELOCITY	2	3	3	5	5	4	

SURVEY BY M. Kniahynycky & G. Slowik

REMARKS

Odd numbers of samples were examined for plankton

Table 26.

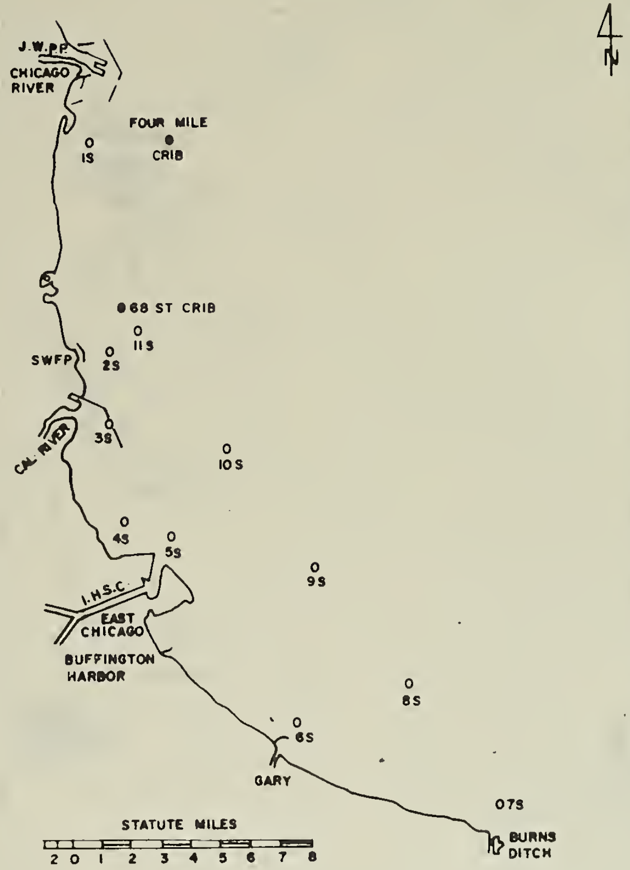
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE NOVEMBER 29, 1977



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME		0900	0937	0950	1007	1016	1053	1125	1148	1211	1234	1257
TEMPERATURE °C	00010	3	4	4	4	4	5	5	5	5	5	5
pH	00400	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.3
TURBIDITY, FTU	00076	4.0	2.6	2.8	3.5	3.1	2.4	2.2	2.5	3.4	2.6	2.5
ODOR THRESHOLD	00086	2M	1M	1M	2DM	2M	1M	1M	1M	1M	1M	1M
PHENOLS µg/l	32730	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITROGEN AMMONIA mg/l	00610	0.01	0.02	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.02
PHOSPHATE, TOTAL mg/l	00650	0.07	0.05	0.06	0.05	0.06	0.05	0.05	0.06	0.07	0.07	0.07
PHOSPHATE, DISS. mg/l	00653	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	.01	0.03	<0.01
OXYGEN DEMAND, CHEMICAL	00340	5 7	7.5	7.5	6.6	5.7	5.7	4.7	5.7	6.6	4.7	4.7
Plate Count 24 hrs. 35 C Per ml	31751	2	6	7	680	2800	2	0	0	0	2	2
PLATE COUNT 48 HRS, 35°C, PER ml	31751	40	620	520	3600	5500	30	18	21	16	20	12
MF-TC PER 100 ml	31503	4	64	116	1480	6200	8	6	4	4	0	0
MF-FC PER 100 ml	31616	0	0	4	96	360	0	0	0	0	0	0
MF-FS PER 100 ml	31679	0	4	2	2	18	0	0	0	0	0	0
PLANKTON PER ml	60050	1200	720	680	460	520	880	760	740	1060	780	520
ACTINOS PER ml		2	1	0	0	0	0	0	1	0	0	0
FUNGI PER ml		0	0	2	0	0	1	0	0	0	3	0

METEOROLOGICAL DATA

TIME	0800	0900	1000	1100	1200	1300	PREVAILING WIND
DIRECTION	S	S	S	SE	SE	SE	S
VELOCITY	1	1	2	5	7	7	

SURVEY BY
M. Kniahynycky & D. Guanoilista

REMARKS

Table 26 (con'td)

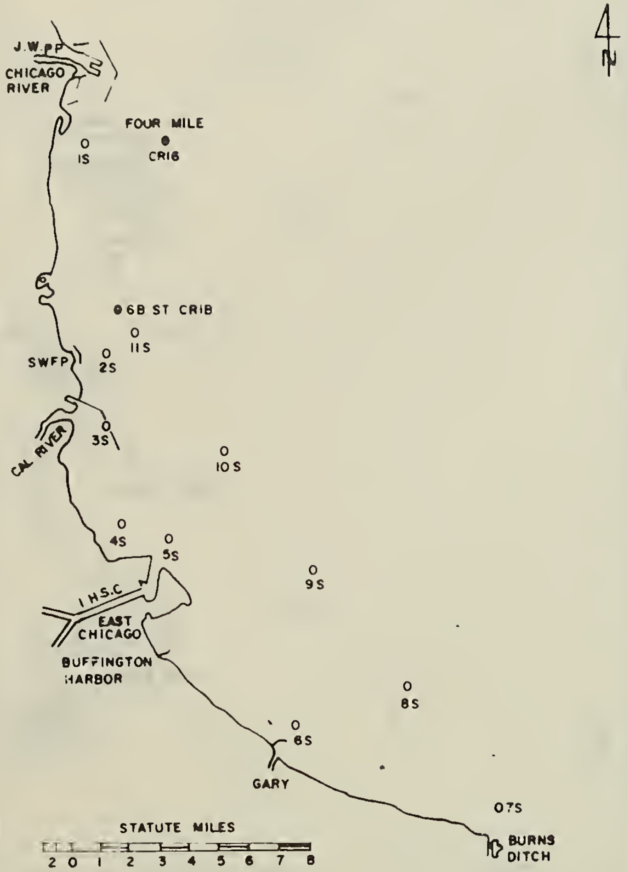
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

SOUTH SHORE LAKE SURVEY

DATE NOVEMBER 29, 19 77



PARAMETER	STORET NUMBER	1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
		SAMPLING POINTS										
TIME												
Chloride		10.0	10.2	10.0	9.8	9.8	9.8	9.4	9.0	9.4	9.2	9.0
Non-Filt. Residue		23	6	16	3	5	6	4	12	7	13	12
Sulfate		19.4	20.0	20.0	20.0	20.0	17.5	17.5	18.0	18.0	18.5	18.0
Nitrate Nitrite		0.21	0.22	0.25	0.22	0.20	0.17	0.17	0.19	0.19	0.17	0.18
Conductivity		290	300	300	300	300	280	285	290	285	285	285
Organic Nitrogen		0.20	0.20	0.20	0.20	0.20	0.16	0.20	0.16	0.16	0.16	0.16
PHOSPHATE, TOTAL mg/l	00650											
PHOSPHATE DISS mg/l	00653											
OXYGEN DEMAND, CHEMICAL	00340											
PLATE COUNT 24 HRS, 35°C, PER ml	31751											
MF-TC PER 100 ml	31503											
MF-FC PER 100 ml	31616											
MF-FS PER 100 ml	31679											
PLANKTON PER ml	60050											
ACTINOS PER ml												
FUNGI PER ml												

METEOROLOGICAL DATA

TIME							PREVAILING WIND
DIRECTION							
VELOCITY							

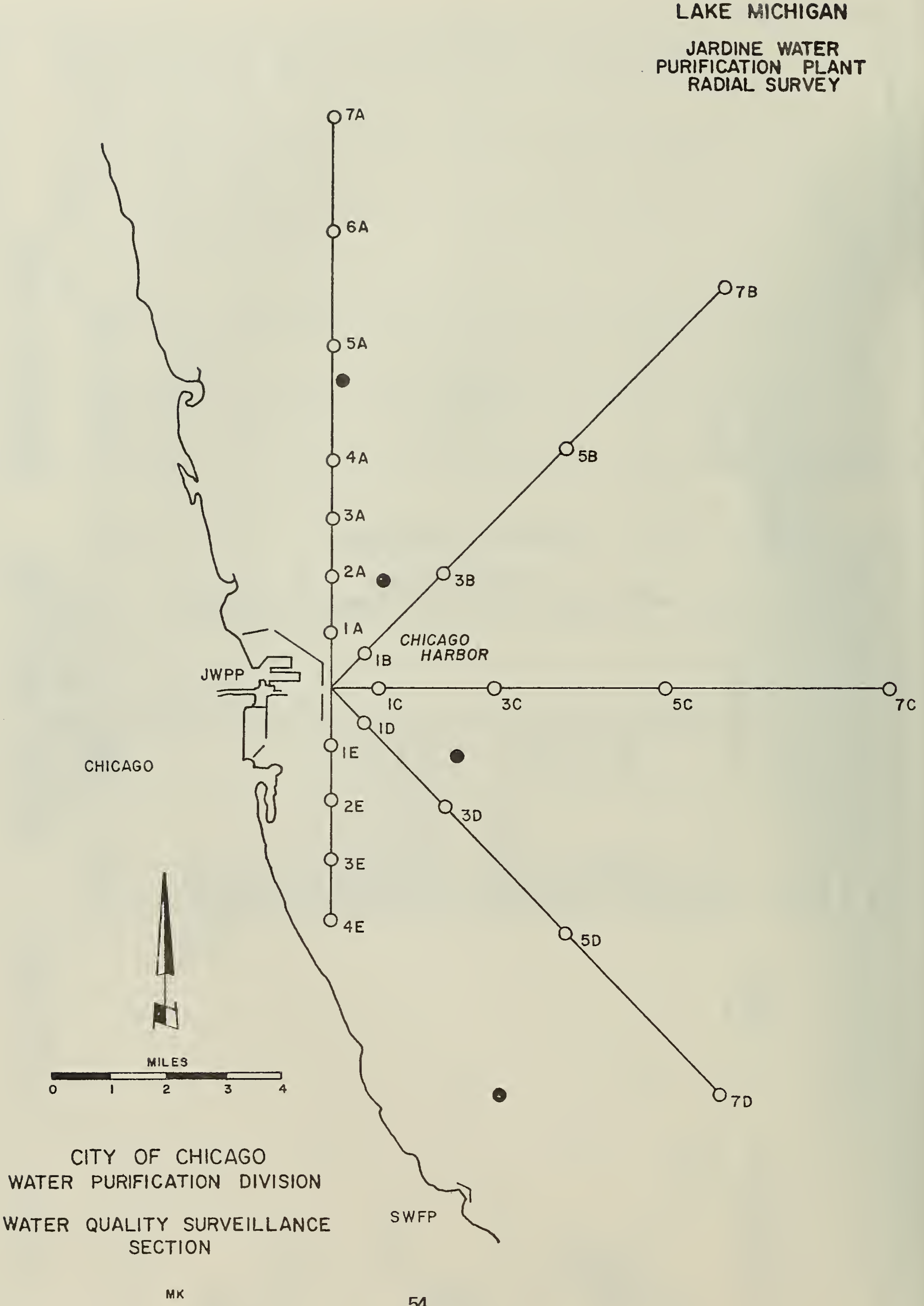
SURVEY BY

REMARKS

Section B (Continued)

Lake Michigan
3. Jardine Water Purification Plant Radial Survey

Figure 12.


LAKE MICHIGAN
JARDINE WATER PURIFICATION PLANT RADIAL SURVEY
7A
6A
5A
4A
3A
2A
1A
7B
5B
3B
1B
CHICAGO HARBOR
JWPP
1C
3C
5C
7C
1D
3D
5D
7D
1E
2E
3E
4E
CHICAGO
MILES
0
1
2
3
4
SWFP
CITY OF CHICAGO
WATER PURIFICATION DIVISION
WATER QUALITY SURVEILLANCE SECTION
MK

Section B (Continued)

Lake Michigan
3. Jardine Water Purification Plant Radial Survey

JARDINE WATER PURIFICATION PLANT RADIAL SURVEY

The J.W.P.P. Radial Lake Survey consists of 23 sample points located along 5 radii of a circle with a point near Chicago's Jardine Water Purification Plant as the center. This survey is intended to assess water quality within 10 miles of the Jardin Plant.

Five surveys were completed between May and October, 1977. Results of mircobiological and chemical analyses are presented in the individual survey data sheets.

Table 27.

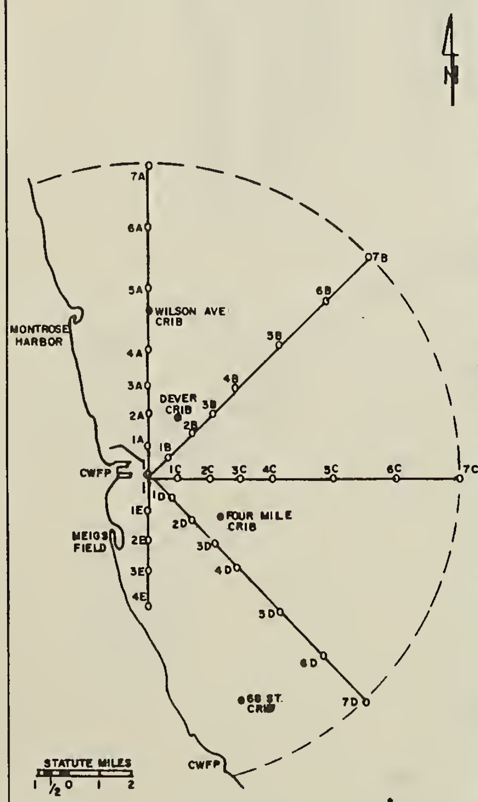
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER
WATER PURIFICATION LABORATORY

C.W.F.P. RADIAL LAKE SURVEY

DATE May 26, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00635	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 24HRS 35°C PER ml.	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml
1A	0850	13	8.5	0.25	1M	<1	10	1.8	0.01	0.20	0.04	0.03	0	0	0	0	20	0	1
2A	0854	13	8.5	0.25	1M	<1	18	1.8	0.01	0.32	0.05	0.02	0	0	0	0		0	1
3A	0858	13	8.5	0.25	1M	<1	18	3.6	0.01	0.24	0.03	0.02	0	0	0	0	720	0	0
4A	0902	13	8.6	0.25	1M	<1	10	0.9	0.01	0.16	0.03	0.03	0	0	0	0		0	1
5A	0910	14	8.5	0.25	2M	<1	<10	1.8	0.01	0.16	0.07	0.04	0	0	0	0	80	0	1
6A	0918	13	8.5	0.25	1M	<1	19	0.9	0.01	0.20	0.03	0.01	0	0	0	0		0	2
7A	0926	13	8.5	0.25	1M	<1	27	0.9	0.01	0.16	0.05	0.03	0	0	0	0	40	0	1
1B	1035	14	8.5	0.30	1M	<1	36	1.8	0.01	0.12	0.08	0.04	0	0	0	0	20	0	0
2B																			
3B	1027	15	8.6	0.25	1M	<1	24	8.9	0.01	0.20	0.07	0.04	0	0	0	0	700	0	0
4B																			
5B	1015	15	8.6	0.25	1M	<1	24	8.0	0.01	0.20	0.07	0.04	0	0	0	0	40	0	0
6B																			
7B	0959	15	8.6	0.25	1M	<1	30	8.9	0.01	0.20	0.07	0.02	0	0	0	0	260	0	1
1C	1051	14	8.6	0.30	1M	<1	32	2.7	0.01	0.12	0.12	0.09	0	0	0	0	0	0	0
2C																			
3C	1059	15	8.6	0.25	1M	<1	24	21.4	0.02	0.16	0.07	0.03	0	0	0	0	40	0	1
4C																			
5C	1111	15	8.6	0.30	2DM	<1	24	29.5	0.02	0.16	0.08	0.04	0	0	0	0	160	0	0
6C																			
7C	1127	15	8.6	0.25	1M	1	11	2.7	0.02	0.16	0.05	0.02	0	0	0	0	40	1	2
1D	1214	14	8.6	0.35	1M	<1	11	6.2	0.01	0.12	0.05	0.02	1	0	0	0	40	0	3
2D																			
3D	1226	16	8.6	0.30	1M	<1	32	1.8	0.02	0.08	0.12	0.05	0	0	0	0	0	0	3
4D																			
5D	1214	16	8.6	0.35	2DM	<1	19	2.7	0.02	0.08	0.03	0.02	0	0	0	0	40	0	2
6D																			
7D	1158	16	8.6	0.30	2DM	1	19	1.8	0.02	0.16	0.05	0.04	0	0	0	0	20	0	1
1E	1239	14	8.6	0.45	1M	<1	18	2.7	0.01	0.12	0.12	0.05	0	0	0	0	800	0	0
2E	1243	14	8.6	0.40	1M	<1	24	1.8	0.01	0.16	0.13	0.03	0	0	0	0		0	2
3E	1247	15	8.6	0.30	1M	<1	38	0.9	0.02	0.16	0.05	0.01	0	0	0	0	0	0	0
4E	1251	15	8.6	0.30	1M	<1	24	5.4	0.01	0.12	0.05	0.04	0	0	0	0		0	0

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	NE	N	N	NW	NW	NW	NW
VELOCITY	1	2	1	2	4	5	

SURVEY BY MK & JS

REMARKS:

Table 28.

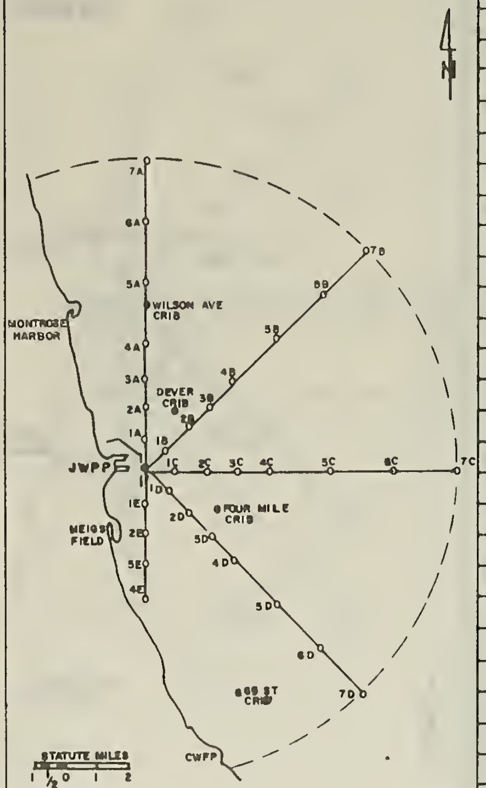
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

J.W.P.P. RADIAL LAKE SURVEY

DATE JUNE 28. 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00608	00653	00650	31751	31503	31616	31679	60050		
PT	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS μg/l	IRON TOTAL ug/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 24 HRS 35°C PER ml	MF-TC PER 100 ml	MF-FC PER 100 ml	MF-FS PER 100 ml	PLANKTON PER ml	ACTINOS PER ml	FUNGI PER ml
1A	0850	18	8.6	0.70	3Df	<1	74	15.2	0.01	0.20	0.08	0.20	1	2	0	0	1880	0	0
2A	0854	18	8.6	0.60	2Df	<1	20	15.2	0.01	0.16	0.01	0.13	1	0	0	0		0	0
3A	0858	19	8.6	0.40	1Df	<1	20	13.3	0.01	0.16	0.03	0.06	0	0	0	0	760	0	0
4A	0902	20	8.6	0.40	1M	<1	11	10.5	0.01	0.12	0.03	0.15	0	0	0	0		0	0
5A	0910	20	8.6	0.40	1M	<1	11	12.4	0.01	0.16	0.03	0.07	0	0	0	0	1120	0	0
6A	0918	20	8.6	0.30	1M	<1	10	16.2	0.01	0.12	0.03	0.14	0	0	0	0		0	1
7A	0926	20	8.6	0.30	1M	<1	11	14.3	0.01	0.20	0.08	0.08	0	0	0	0	1020	1	1
1B	1033	20	8.6	0.30	1M	<1	100	21.0	0.01	0.16	0.05	0.05	0	0	0	0	440	0	0
2B																			
3B	1025	20	8.6	0.25	1M	<1	11	15.2	0.01	0.08	0.02	0.08	0	0	0	0	280	0	0
4B																			
5B	1013	20	8.6	0.20	1M	1	10	19.0	0.01	0.20	0.04	0.16	0	0	0	0	240	0	0
6B																			
7B	0957	20	8.6	0.20	1M	<1	20	11.4	0.01	0.16	0.04	0.16	1	0	0	0	80	0	0
1C	1050	21	8.6	0.35	1M	<1	20	28.6	0.01	0.12	0.03	0.16	0	0	0	0	560	0	0
2C																			
3C	1058	20	8.6	0.25	1M	<1	11	16.2	0.01	0.16	0.02	0.14	1	0	0	0	220	0	0
4C																			
5C	1110	20	8.5	0.25	1M	<1	27	21.9	0.01	0.12	0.04	0.09	0	0	0	0	330	0	0
6C																			
7C	1126	21	8.6	0.25	1M	<1	10	13.3	0.01	0.12	0.03	0.05	0	0	0	0	260	0	0
1D	1233	21	8.6	0.35	1M		15	9.5	0.01	0.12	0.05	0.17	0	0	0	0	320	0	0
2D																			
3D	1225	21	8.6	0.30	1M	<1	10	5.7	0.01	0.16	0.03	0.38	0	0	0	0	1060	0	0
4D																			
5D	1213	22	8.6	0.30	1M	<1	10	7.6	0.01	0.12	0.02	0.09	1	0	0	0	840	0	1
6D																			
7D	1241	21	8.6	0.40	2M	<1	10	4.8	0.01	0.16	0.11	0.26	1	0	0	0	700	0	0
1E	1241	21	8.6	0.60	2M	<1	10	8.6	0.00	0.16	0.05	0.20	0	0	2	0	600	0	0
2E	1245	21	8.6	0.45	2M	1	10	7.6	0.00	0.12	0.03	0.09	0	0	0	0		0	0
3E	1249	21	8.6	0.45	1M	1	11	10.5	0.01	0.20	0.02	0.04	0	0	0	0	1080	0	0
4E	1253	21	8.6	0.60	1M	<1	10	11.4	0.01	0.20	0.09	0.15	0	0	0	0		0	0

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	SW	W	E	E	E	E	E
VELOCITY	8	9	5	5	3	4	

SURVEY BY MK & JS

REMARKS:

Table 29.

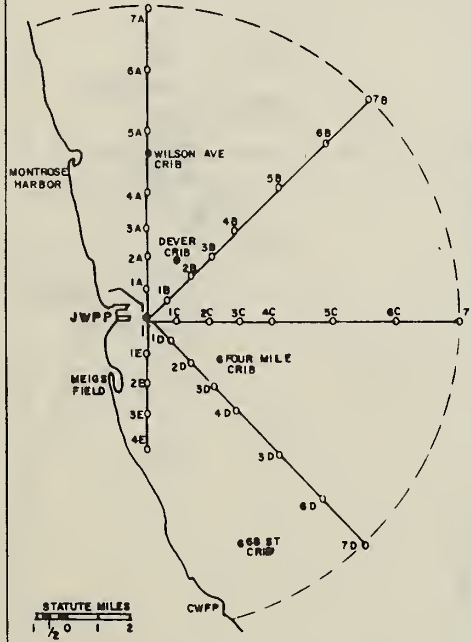
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

J.W.P.P. RADIAL LAKE SURVEY

DATE AUGUST 23, 1977



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 35 C Per ml 24 / 48	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml
1A	0919	19	8.4	0.65	2Df	<1	<10	11.3	<0.01	0.16	0.07	0.17	2 / 19	12	0	0	20	0	0
2A	0923	19	8.5	0.60	2Df	<1	10	5.7	<0.01	0.16	0.07	0.09	2 / 27	10	0	0		0	0
3A	0927	19	8.5	0.80	2Df	<1	10	6.6	<0.01	0.12	0.05	0.06	3 / 55	8	0	0	180	1	0
4A	0931	19	8.5	0.70	1M	<1	10	4.7	<0.01	0.16	0.01	0.03	2 / 17	8	0	0		0	0
5A	0939	19	8.6	0.65	1M	<1	<10	4.7	<0.01	0.16	<0.01	0.05	0 / 11	0	0	0	180	0	0
6A	0947	20	8.6	0.55	1M	<1	10	4.7	0.02	0.12	0.01	0.04	6 / 13	0	0	0		0	0
7A	0955	20	8.6	0.50	1M	<1	<10	2.8	0.01	0.16	<0.01	0.06	0 / 4	0	0	0	120	0	0
1B	1108	20	8.6	0.60	1M	<1	10	9.4	0.01	0.16	0.02	0.05	5 / 36	0	2	0	600	0	0
2B																			
3B	1054	20	8.6	0.60	1M	<1	15	12.3	<0.01	0.08	0.01	0.05	0 / 21	4	0	0	60	0	0
4B																			
5B	1042	20	8.6	0.60	1M	<1	20	6.4	<0.01	0.20	0.01	0.03	0 / 7	0	0	0	60	0	0
6B																			
7B	1026	20	8.6	0.55	1M	<1	30	11.3	<0.01	0.24	0.05	0.08	1 / 3	0	0	0	80	0	0
1C	1113	20	8.6	0.60	1M	<1	50	5.7	0.02	0.24	0.04	0.06	10 / 80	2	0	0	380	0	1
2C																			
3C	1121	20	8.6	0.65	1M	1	10	9.4	<0.01	0.20	0.03	0.07	12 / 130	4	0	0	60	0	0
4C																			
5C	1133	21	8.6	0.45	1M	<1	10	11.3	<0.01	0.16	0.01	0.08	0 / 3	0	0	0	40	1	0
6C																			
7C	1149	21	8.6	0.45	1M	<1	10	11.3	0.02	0.16	0.02	0.06	1 / 4	0	0	0	20	0	0
1D	1255	20	8.6	0.70	2M	<1	10	9.4		0.24	0.01	0.07	14 / 92	0	0	0	60	0	0
2D																			
3D	1248	20	8.6	0.65	1M	<1	10	10.4	0.01	0.20	0.01	0.01	10 / 77	4	0	0	100	1	0
4D																			
5D	1236	21	8.6	0.55	1M	<1	10	8.5	<0.01	0.16	0.03	0.04	40 / 190	8	2	0	40	0	0
6D																			
7D	1220	21	8.6	0.50	1M	<1	10	7.5	<0.01	0.28	0.01	0.05	1 / 6	0	0	0	20	0	0
1E	1300	20	8.6	0.60	1M	<1	10	11.3	<0.01	0.20	0.01	0.04	18 / 87	2	0	0	40	0	1
2E	1304	20	8.6	0.70	2M	<1	10	9.4	0.02	0.20	0.01	0.05	5 / 25	2	0	0		0	1
3E	1308	20	8.5	0.75	1M	<1	10	11.3	0.02	0.12	0.01	0.02	7 / 36	4	0	0	80	0	0
4E	1312	20	8.5	0.80	1M	<1	10	16.0	0.01	0.24	0.01	0.04	2 / 15	2	0	0		0	0

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	N	NE	NE	NE	N	NE	NE
VELOCITY	2	3	4	6	6	6	

SURVEY BY M. Kniahynycky & G. Slowik

REMARKS:

Table 30.

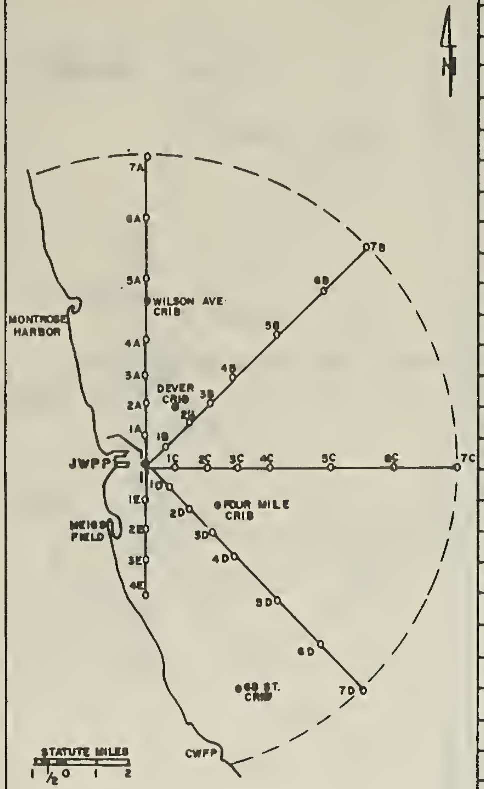
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

J.W.P.P. RADIAL LAKE SURVEY

DATE SEPT. 29, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 35 C Per ml 24 / 48	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml
1A	0848	14	8.4	0.90	2M	<1	21	10.8	<0.01	0.16	0.04	0.05	0 / 0	56	0	0	940	0	1
2A	0852	14	8.4	0.85	2M	<1	10	10.8	<0.01	0.16	0.01	0.04	0 / 0	140	0	0		0	0
3A	0856	14	8.4	0.80	1M	<1	16	7.5	<0.01	0.20	0.01	0.05	0 / 2	116	0	0	2480	0	0
4A	0900	14	8.4	0.80	2M	<1	50	9.7	<0.01	0.16	<0.01	0.07	0 / 0	132	0	0		0	1
5A	0908	14	8.5	0.80	1M	<1	15	14.0	<0.01	0.16	<0.01	0.08	3 / 5	72	0	0	260	0	2
6A	0916	14	8.5	0.65	1M	<1	16	15.1	<0.01	0.16	0.01	C.05	0 / 0	110	0	0		0	0
7A	0924	14	8.5	0.60	1M	<1	16	7.5	<0.01	0.16	0.01	0.03	0 / 1	116	0	0	360	0	0
1B	1035	14	8.5	0.65	1M	<1	21	9.7	<0.01	0.16	0.01	0.04	4 / 19	90	0	0	520	0	0
2B																			
3B	1023	14	8.5	0.50	1M	<1	13	9.7	<0.01	0.16	0.03	0.05	0 / 2	48	0	0	0	0	0
4B																			
5B	1011	14	8.5	0.55	1M	<1	10	9.7	<0.01	0.16	0.01	0.05	2 / 8	48	0	0	300	0	0
6B																			
7B	0955	13	8.5	0.40	2MG	<1	10	9.7	<0.01	0.16	<0.01	0.04	0 / 2	14	0	0	40	0	0
1C	1042	14	8.5	0.60	1MG	<1	19	8.6	<0.01	0.20	0.04	0.07	0 / 1	68	0	0	140	0	1
2C																			
3C	1050	14	8.5	0.55	1M	<1	10	7.5	<0.01	0.16	0.04	0.04	4 / 17	44	0	0	40	0	0
4C																			
5C	1102	14	8.5	0.50	1M	<1	19	9.7	<0.01	0.16	0.03	0.07	10 / 26	22	0	0	460	0	0
6C																			
7C	1118	14	8.5	0.45	1M	<1	10	20.4	<0.01	0.16	0.03	0.04	0 / 1	12	0	0	0	0	1
1D	1225	14	8.4	0.80	2M	2	21	4.3	<0.01	0.16	0.01	0.04	4 / 8	94	0	0	400	0	0
2D																			
3D	1217	14	8.5	0.60	1M	2	13	17.2	<0.01	0.16	0.01	0.05	5 / 7	54	0	0	0	0	0
4D																			
5D	1205	14	8.5	0.55	1M	<1	10	7.5	<0.01	0.16	0.01	0.03	2 / 76	60	0	0	320	0	0
6D																			
7D	1149	14	8.5	0.55	2M	<1	19	4.3	0.01	0.16	0.01	0.04	0 / 0	16	0	0	960	0	0
1E	1233	14	8.4	1.0	1M	<1	10	4.3	<0.01	0.16	0.01	0.05	1 / 2	66	0	0	360	0	1
2E	1237	14	8.4	0.85	1M	<1	10	5.4	<0.01	0.20	0.03	0.03	1 / 3	94	0	0		0	2
3E	1241	14	8.4	0.80	1M	2	10	5.4	<0.01	0.16	0.03	0.04	9 / 28	70	0	0	520	0	1
4E	1245	14	8.4	0.75	1M	<1	10	8.2	<0.01	0.20	0.04	0.05	3 / 10	78	0	0		0	1

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	S	S	S	S	SE	SE	S
VELOCITY	6	5	5	5	5	7	

SURVEY BY M. Knianynycky, G. Slowik, J. Shadle

REMARKS:

Table 31.

CITY OF CHICAGO
WATER PURIFICATION DIVISION

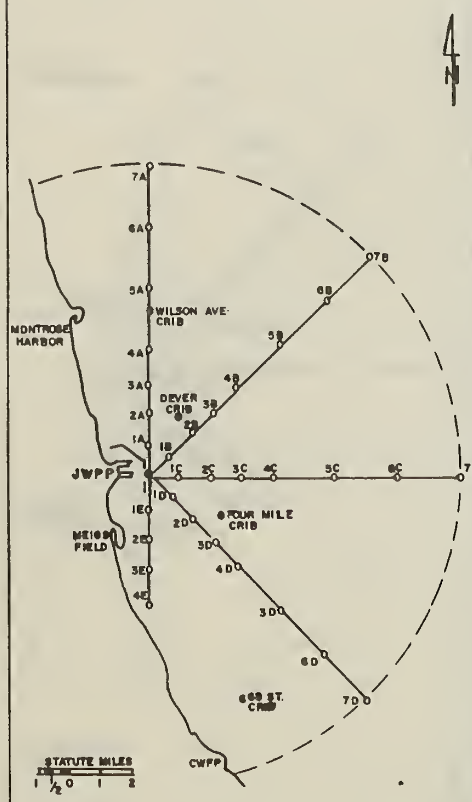
DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

PAGE 1 of 2

J.W.P.P. RADIAL LAKE SURVEY

DATE Oct. 25, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 35 C Per ml 24 / 48	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml
1A	0850	11	8.3	4.4	2M	1	110	8.1	0.01	0.20	0.02	0.09	26 / 41	10	2	0	2000	1	3
2A	0854	11	8.3	2.8	1M	<1	60	4.0	0.01	0.12	<0.01	0.05	45 / 50	0	0	0	1260		
3A	0858	11	8.3	2.6	1M	<1	70	5.1	0.02	0.20	0.01	0.04	12 / 15	4	0	0	2740	2	0
4A	0902	11	8.3	2.5	1M	<1	80	8.1	0.02	0.16	<0.01	0.03	10 / 16	4	0	0	2740	1	1
5A	0910	11	8.3	1.6	1M	<1	30	7.1	0.01	0.12	0.01	0.04	6 / 12	8	0	0	200		
6A	0918	12	8.3	0.85	1M	<1	16	4.0	0.01	0.12	<0.01	0.03	6 / 8	0	0	0	1340	2	0
7A	0926	12	8.3	0.95	1M	<1	34	4.0	0.02	0.16	<0.01	0.03	26 / 30	6	0	0	480	3	1
1B	1040	11	8.3	2.0	1M	<1	34	4.0	0.01	0.12	0.01	0.04	11 / 13	4	0	0	1080	1	0
2B																			
3B	1025	11	8.3	1.5	1M	<1	30	4.0	0.02	0.04	0.01	0.05	13 / 15	2	0	0	1180	9	1
4B																			
5B	1013	11	8.3	0.85	1M	<1	70	9.1	0.01	0.12	0.03	0.07	26 / 28	0	0	0	460	6	1
6B																			
7B	0957	12	8.3	0.50	1M	<1	10	8.1	0.01	0.16	0.01	0.04	18 / 21	2	0	0	200	2	0
1C	1044	11	8.3	1.5	1DM	<1	34	6.1	0.01	0.12	0.08	0.15	12 / 14	4	0	0	1140	0	0
2C																			
3C	1052	11	8.3	1.1	1M	2	21	4.0	0.01	0.16	<0.01	0.03	23 / 24	2	0	0	1560	1	3
4C																			
5C	1104	12	8.4	1.1	1M	<1	34	12.1	0.03	0.12	0.01	0.04	93 /240	118	0	0	1060	2	0
6C																			
7C	1120	12	8.3	0.60	1M	<1	80	7.1	0.01	0.12	0.04	0.04	15 / 18	0	6	0	1000		
1D	1227	12	8.3	2.0	1M	<1	56	8.1	0.01	0.16	<0.01	0.03	19 / 21	2	0	0	1180	1	0
2D																			
3D	1219	12	8.3	1.5	1M	<1	34	7.1	0.01	0.16	<0.01	0.01	24 / 28	0	2	0	2500	5	3
4D																			
5D	1207	12	8.4	0.95	1M	<1	32	5.1	0.01	0.36	0.03	0.04	42 / 50	8	0	0	2480	2	1
6D																			
7D	1151	12	8.4	0.90	1M	<1	25	5.1	0.01	0.12	0.03	0.03	72 / 86	2	0	0	1320	3	3
1E	1252	11	8.3	2.5	2M	<1	19	7.1	0.01	0.16	0.02	0.04	12 / 28	4	0	0	1080	1	2
2E	1256	11	8.3	2.5	1M	<1	19	6.1	0.01	0.20	<0.01	0.02	45 / 50	2	0	0		3	1
3E	1300	11	8.4	1.7	1M	<1	63	6.1	0.01	0.16	<0.01	0.02	10 / 18	2	0	0	1780	3	5
4E	1304	11	8.4	1.3	1M	<1	47	5.1	0.01	0.20	<0.01	0.04	12 / 32	4	0	0		2	1

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	SE	SE	SE	SE	S	S	SE
VELOCITY	3	5	8	9	9	7	

SURVEY BY MK/GS/EF

REMARKS:

Table 32. (cont'd)

CITY OF CHICAGO
WATER PURIFICATION DIVISION

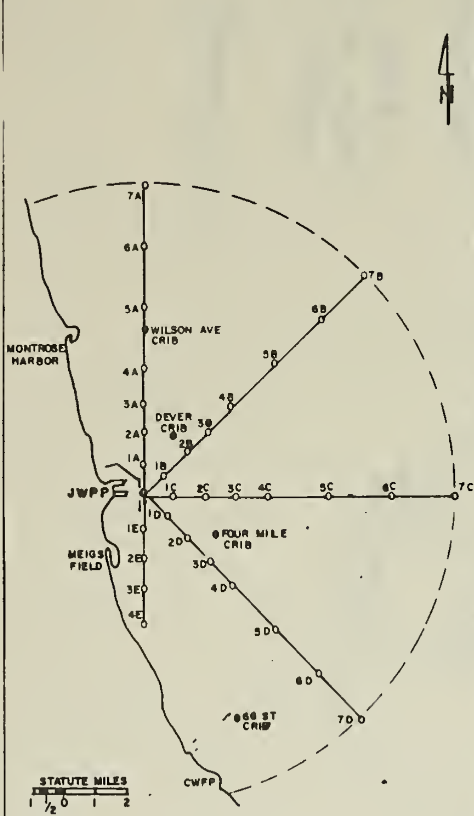
DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

PAGE 2 of 2

J.W.P.P. RADIAL LAKE SURVEY

DATE Oct. 25, 19 77



STORET NO.		00945	00940	00095	00530	00630	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT	TIME	Sulfate mg/l	Chloride mg/l	Conductivity umhos	non-Filterable Residue	NO_3-NO_2 mg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 24 HRS 35°C PER ml	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml	ACTINOS PER ml.	FUNGI PER ml
1A		24.0	10.8	275	2	0.18													
2A		23.0	8.8	285	8	0.17													
3A		22.5	9.6	285	2	0.18													
4A		23.5	8.8	285	0	0.21													
5A		23.5	8.8	290	6	0.19													
6A		23.3	8.6	280	8	0.19													
7A		23.5	8.2	280	3	0.19													
1B		23.7	8.3	285	18	0.19													
2B																			
3B		20.9	9.7	285	12	0.20													
4B																			
5B		22.9	9.4	280	7	0.19													
6B																			
7B		23.0	8.8	275	10	0.19													
1C		23.4	8.8	285	9	0.19													
2C																			
3C		23.0	9.0	285	6	0.18													
4C																			
5C		22.9	9.6	290	8	0.19													
6C																			
7C		20.1	9.8	275	0	0.18													
1D		22.7	8.9	285	10	0.18													
2D																			
3D		22.2	8.6	280	11	0.18													
4D																			
5D		22.2	10.2	285	5	0.18													
6D																			
7D		22.4	8.8	285	6	0.18													
1E		23.0	8.8	285	11	0.18													
2E		21.4	8.8	280	15	0.18													
3E		21.2	10.2	285	0	0.18													
4E		21.5	10.4	285	10	0.17													

METEOROLOGICAL DATA						PREVAILING WIND
TIME						
DIRECTION						
VELOCITY						

SURVEY BY

REMARKS:

Section B (Continued)

Lake Michigan

4. South Water Filtration Plant Radial Survey

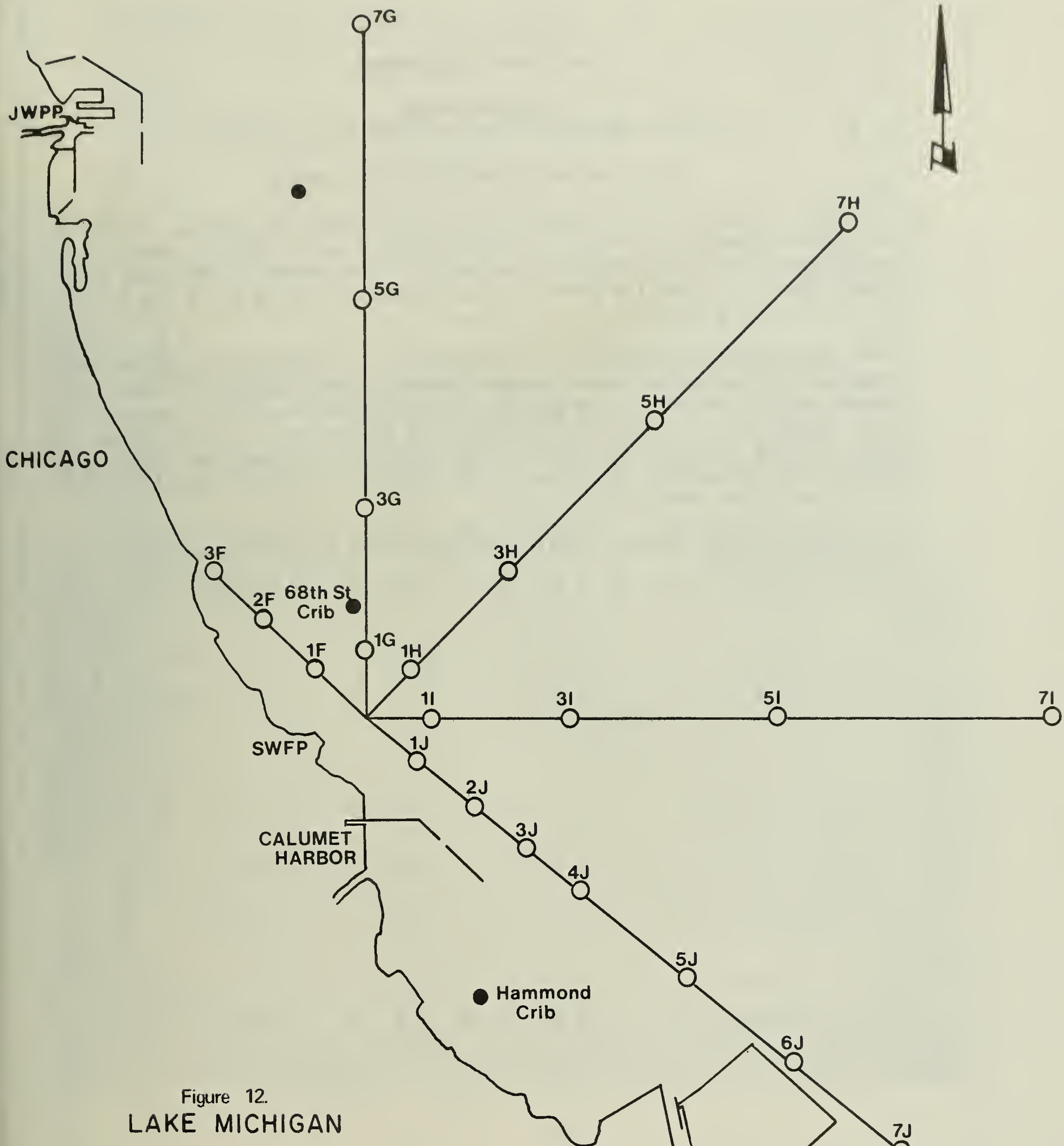


Figure 12.
LAKE MICHIGAN

SOUTH WATER
FILTRATION PLANT
RADIAL SURVEY

Lake Michigan
4. South Water Filtration Plant Radial Survey

SOUTH WATER FILTRATION RADIAL SURVEY

The S.W.F.P. Radial Lake Survey consists of 22 sampling points. These are located along five radii of a wheel using a point near Chicago's South Water Filtration Plant as the center. The survey is designed to assess the quality of the water in the vicinity of the S.W.F.P. up to a distance of 10 miles.

Water quality in the vicinity of this survey is strongly affected by the behavior of discharges in the Calumet-Indiana Harbor industrial area. Meteorological conditions determine to what extent the Indiana Harbor Canal plume and other shore discharges will be carried into the survey area. Radius "J" of the survey is most directly affected, followed by radius "I", and points along these radii usually show the highest levels of bacterial and chemical pollution.

All biological and chemical data is given in the following individual survey data sheets.

Table 32.

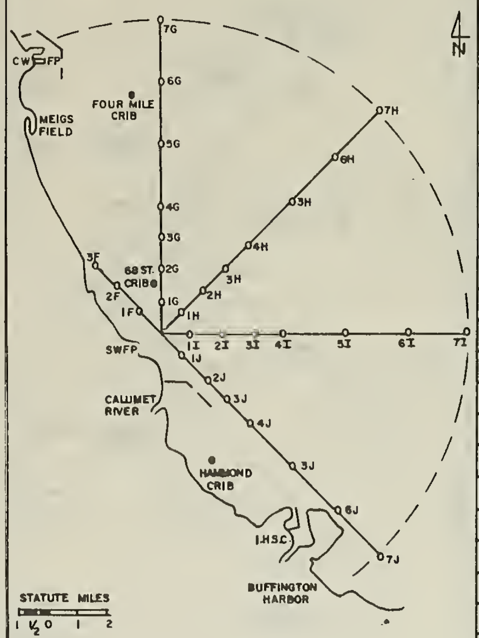
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER
WATER PURIFICATION LABORATORY

S.W.F.P. RADIAL LAKE SURVEY

DATE April 21, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00635	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 24 HRS 35°C PER ml	MF-TC PER 100 ml.	MF-FC PER 100 ml	MF-FS PER 100 ml	PLANKTON PER ml	ACTINOS PER ml	FUNGI PER m
1F	1158	8	8.4	0.55	1M	<1	24	4.7	0.02	0.12	0.05	0.13	2	840	2	0	700	0	1
2F	1202	8	8.5	0.40	1M	<1	19	6.2	0.02	0.12	0.03	0.09	20	940	2	0		0	2
3F	1206	8	8.5	0.55	1M	<1	19	9.3	0.01	0.16	0.04	0.11	17	1240	0	0	1000	1	0
1G	0938	10	8.5	0.45	2DM	<1	24	7.0	0.02	0.12	0.02	0.10	20	3550	2	0		0	1
2G																			
3G	0930	10	8.5	0.45	2M	1	19	13.2	0.02	0.16	0.04	0.05	33	1950	4	0	740	0	2
4G																			
5G	0918	10	8.5	0.40	2M	<1	21	10.9	0.02	0.12	0.03	0.05	1	2	0	0		0	2
6G																			
7G	0902	11	8.5	0.35	1M	<1	21	10.1	0.02	0.12	0.03	0.04	0	0	0	0	480	0	3
1H	1224	10	8.5	0.40	1M	<1	18	15.5	0.02	0.20	0.03	0.09	19	1700	20	0		1	2
2H																			
3H	1233	10.5	8.5	0.50	2M	<1	33	17.0	0.05	0.24	0.07	0.10	40	510	6	0	280	0	0
4H																			
5H	1246	10	8.5	0.35	1M	<1	21	14.0	0.02	0.24	0.06	0.07	0	0	0	0		0	0
6H																			
7H	1303	10	8.5	0.35	1M	<1	40	6.2	0.02	0.16	0.03	0.09	0	0	0	0	660	0	1
1I	1138	9	8.5	0.45	1M	<1	35	6.2	0.04	0.20	0.07	0.08	45	670	0	0		1	2
2I																			
3I	1129	8.5	8.4	0.55	1M	<1	36	7.6	0.06	0.16	0.03	0.10	460	1600	116	0	1000	0	0
4I																			
5I	1116	9	8.5	0.40	1M	<1	26	1.6	0.03	0.24	0.04	0.05	0	8	0	0		0	1
6I																			
7I	1059	9	8.5	0.40	2DM	1	26	7.6	0.03	0.16	0.02	0.07	0	2	0	0	480	0	0
1J	0954	9	8.5	0.50	1M	<1	33	11.6	0.02	0.20	0.07	0.11	46	4100	10	0		0	1
2J	0958	8.5	8.5	0.50	1M	<1	34	11.6	0.03	0.24	0.05	0.08	63	3500	6	0	560	0	1
3J	1002	9	8.5	0.45	1M	1	34	12.4	0.02	0.20	0.04	0.05	310	8000	12	0		0	1
4J	1006	10	8.5	0.50	1M	<1	34	11.6	0.02	0.16	0.01	0.07	230	3400	8	0	1680	0	1
5J	1015	9	8.4	0.80	2DM	2	33	7.0	0.02	0.20	0.02	0.08	1500	5750	600	0		0	1
6J	1024	8	8.5	0.50	2DM	1	52	9.3	0.02	0.16	<0.01	0.05	3	84	0	0	1060	0	2
7J	1033	8	8.5	0.45	1M	<1	26	2.3	0.02	0.12	0.03	0.05	0	2	0	0		1	1

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	S	S	S	S	S	-	S
VELOCITY	13	12	14	13	16		

SURVEY BY M.K. & G.S.

REMARKS:

Table 33.

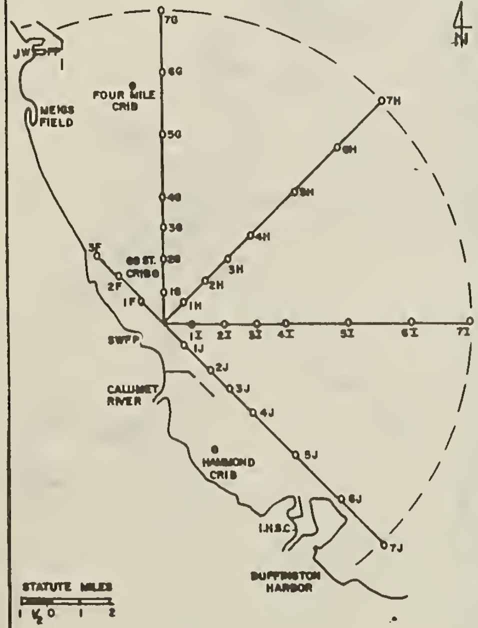
CITY OF CHICAGO,
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

S.W.F.P. RADIAL LAKE SURVEY

DATE JULY 19, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 24HRS 35°C PER ml.	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER m
1F	1157	21	8.5	0.50	1DMG	<1	50	14.1	0.01	0.28	0.09	0.14	12	0	0	0	100	0	0
2F	1201	21	8.5	0.55	2DMG	1	30	18.2	0.01	0.16	0.01	0.04	1	0	0	0		0	0
3F	1205	19	8.5	0.85	2DMG	<1	20	13.1	0.01	0.08	<0.01	0.03	3	0	0	0	1000	0	1
1G	0949	22	8.5	0.45	2G	<1	19	15.1	0.01	0.08	0.03	0.03	21	4	0	0	200	0	0
2G																			
3G	0938	22	8.5	0.40	2G	<1	20	13.1	0.01	0.12	0.01	0.04	6	0	0	0	80	0	0
4G																			
5G	0925	23	8.5	0.30	2G	<1	10	12.1	0.01	0.28	0.01	0.04	3	0	0	0	0	0	0
6G																			
7G	0908	23	8.5	0.30	2G	1	15	10.1	0.00	0.16	0.01	0.03	1	2	0	0	40	0	0
1H	1224	23	8.5	0.45	2G	1	14	13.1	0.01	0.12	0.03	0.06	2	0	0	0	0	0	1
2H																			
3H	1233	23	8.5	0.40	2G	<1	10	12.1	0.02	0.08	0.03	0.09	1	0	0	0	0	0	0
4H																			
5H	1246	24	8.5	0.40	2DMG	<1	10	17.2	0.01	0.28	0.03	0.03	0	0	0	0	40	0	0
6H																			
7H	1303	24	8.5	0.25	2G	<1	10	13.1	0.00	0.24	0.03	0.05	1	0	0	0	80	0	0
1I	1144	23	8.5	0.50	2E	<1	45	10.1	0.01	0.24	0.03	0.05	37	30	4	0	0	0	0
2I																			
3I	1135	23	8.5	0.35	2G	<1	10	11.1	0.01	0.20	0.03	0.07	1	2	0	0	0	0	2
4I																			
5I	1122	23	8.5	0.25	2DMG	<1	10	12.1	0.03	0.16	0.05	0.07	2	0	0	0	40	0	0
6I																			
7I	1105	23	8.6	0.30	2ME	1	<10	11.1	0.03	0.16	0.05	0.09	3	0	0	0	0	0	1
1J	1000	22	8.5	0.50	2ME	<1	<10	17.2	0.03	0.24	0.09	0.19	360	70	4	0	360	0	0
2J	1004	22	8.5	0.55	2DM	<1	10	22.2	0.02	0.24	0.04	0.08	480	144	6	0		1	1
3J	1008	22	8.5	0.60	2E	<1	100	14.1	0.01	0.24	0.03	0.05	630	200	12	0	420	0	0
4J	1012	22	8.5	0.60	2E	<1	12	11.1	0.05	0.28	0.04	0.09	870	160	0	0		1	0
5J	1021	23	8.5	0.40	2DME	<1	10	14.1	0.00	0.20	0.06	0.09	130	64	0	0	0	0	0
6J	1030	22	8.5	0.85	2E	<1	30	15.2	0.05	0.24	0.03	0.07	2000	1000	104	0		0	0
7J	1039	23	8.5	0.45	2E	<1	150	14.1	0.00	0.20	0.09	0.14	9	4	0	0	0	0	0

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300/1400	
DIRECTION	SW	SW	SW	SW	SW	SW / [illegible]	SW
VELOCITY	7	7	6	6	6	7 / 7	

SURVEY BY MK & JS

REMARKS:

Table 34.

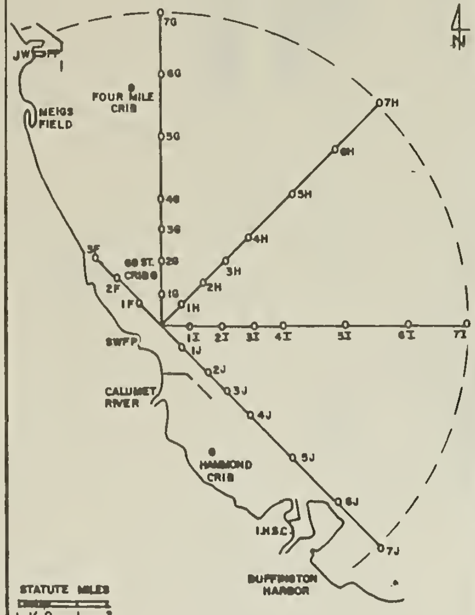
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

S.W.F.P. RADIAL LAKE SURVEY

DATE SEPT. 7, 19 77



STORET NO.		00010	00400	00076	00086	32730	01045	00340	00610	00605	00653	00650	31751	31503	31616	31679	60050		
PT.	TIME	TEMPERATURE °C	pH	TURBIDITY FTU	ODOR THRESHOLD	PHENOLS µg/l	IRON TOTAL µg/l	COD mg/l	NITROGEN AMMONIA mg/l	NITROGEN ORGANIC mg/l	PHOSPHATE DISSOLVED mg/l	PHOSPHATE TOTAL mg/l	PLATE COUNT 35 C Per ml 24 48	MF-TC PER 100 ml.	MF-FC PER 100 ml.	MF-FS PER 100 ml.	PLANKTON PER ml.	ACTINOS PER ml.	FUNGI PER ml
1F	1150	20	8.5	0.95	1M	1	22	8.5	<0.01	0.28	0.09	0.12	5 / 72	4	0	0	260	0	1
2F	1154	20	8.5	1.0	1M	<1	20	12.3	<0.01	0.16	0.03	0.12	2 / 20	2	0	0		0	1
3F	1158	20	8.5	1.0	1M	1	16	7.5	<0.01	0.12	0.01	0.12	0 / 2	4	0	0	720	0	0
1G	0942	20	8.5	0.80	2M	<1	22	6.6	0.01	0.12	0.02	0.11	1 / 36	6	0	0	140	1	1
2G																			
3G	0930	20	8.5	0.75	1M	<1	10	14.2	<0.01	0.16	0.02	0.12	1 / 5	0	0	0	80	0	0
4G																			
5G	0917	20	8.5	0.65	1M	<1	14	8.5	<0.01	0.12	0.32	0.38	0 / 9	0	0	0	80	0	0
6G																			
7G	0900	20	8.5	0.60	1M	<1	10	7.5	<0.01	0.16	0.03	0.13	1 / 24	0	0	0	120	0	0
1H	1215	20	8.5	0.60	1M	<1	10	11.3	<0.01	0.12	0.02	0.13	0 / 11	0	0	0	40	0	0
2H																			
3H	1224	20	8.5	0.65	1M	<1	<10	8.5	<0.01	0.12	0.02	0.06	0 / 4	0	0	0	20	0	0
4H																			
5H	1237	20	8.5	0.75	1M	<1	10	6.6	0.01	0.20	0.07	0.35	0 / 6	2	0	0	140	0	0
6H																			
7H	1254	20	8.5	0.85	2M	<1	<10	29.2	0.01	0.20	0.09	0.15	0 / 11	0	0	0	100	0	0
1I	1140	20	8.5	0.65	1M	<1	<10	11.3	0.01	0.20	0.02	0.16	0 / 10	0	0	0	60	0	0
2I																			
3I	1127	20	8.5	0.60	1M	<1	10	12.3	0.01	0.16	0.03	0.16	130/820	178	8	0	60	0	0
4I																			
5I	1115	20	8.5	0.60	1M	<1	<10	17.9	0.01	0.20	0.02	0.12	0 / 2	0	0	0	0	0	0
6I																			
7I	1058	20	8.5	0.75	1M	<1	<10	9.4	0.01	0.16	0.02	0.06	0 / 2	4	0	0	60	0	0
1J	0953	20	8.5	0.90	1M	<1	20	12.3	0.03	0.16	0.02	0.10	50 /400	96	0	0	100	0	1
2J	0957	20	8.5	0.80	1M	<1	23	15.1	0.03	0.16	0.02	0.20	430/630	1600	34	0		0	1
3J	1001	20	8.4	0.95	2M	<1	42	7.5	0.05	0.16	0.02	0.22	570/2000	1420	20	0	100	3	0
4J	1005	20	8.4	1.1	2M	<1	33	6.6	0.2	0.16	0.02	0.13	1900/4200	7400	64	0		0	2
5J	1014	20	8.4	0.85	1M	<1	33	6.6	0.1	0.16	0.02	0.11	2300/4300	11800	385	0	180	0	2
6J	1023	20	8.5	0.90	1M	<1	26	20.4	0.03	0.12	0.02	0.07	70/ 820	300	24	0		0	3
7J	1032	20	8.5	0.70	1M	<1	20	27.9	0.03	0.12	0.08	0.09	18/ 200	118	2	0	100	0	0

METEOROLOGICAL DATA							PREVAILING WIND
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	S	SE	E	NE	N	N	-
VELOCITY	1	1	1	1	6	10	

SURVEY BY MK & JS

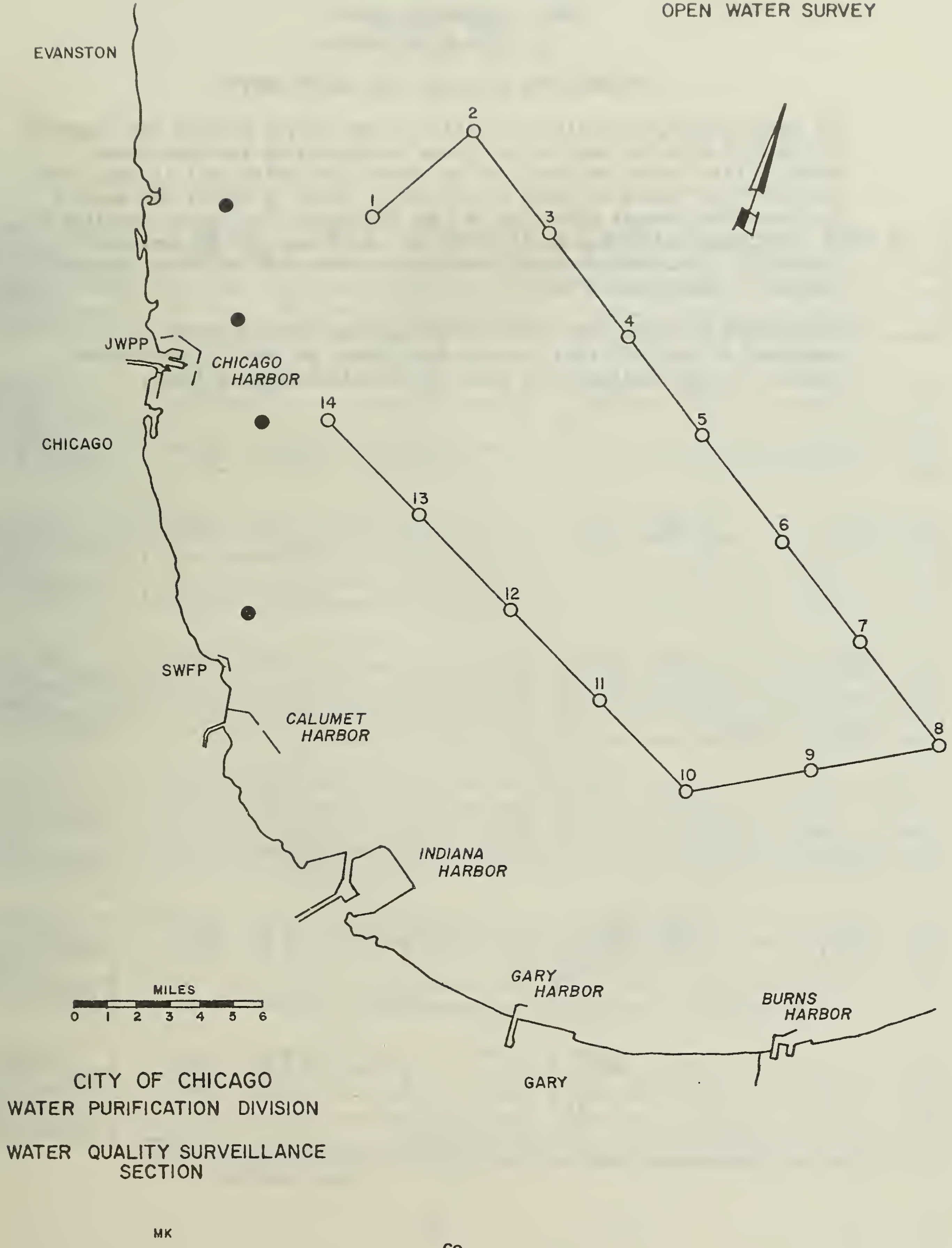
REMARKS:

Section B (Continued

Lake Michigan

5. Open Water Survey

Figure 13.
LAKE MICHIGAN
OPEN WATER SURVEY



Lake Michigan
5. Open Water Survey

CHICAGO-LAKE MICHIGAN OPEN WATER SURVEY

The Water Quality Surveillance Section's lake survey program was expanded during 1977 with the addition of a new survey called the Open Water Survey. This survey was designed to assess open water quality away from the direct influence of shore discharges in order to detect and monitor the long-term changes occurring in Lake Michigan. The survey consists of 14 points located from 6 to 17 miles off shore and will be performed seasonally. Data obtained will be used as reference for other surveys located in near-shore areas.

The results of three completed surveys and one partial survey are presented in the individual survey data sheets on the following pages. Results of algae analyses are given in the Algae Summary Table.

Figure 35

OPEN WATER LAKE SURVEY

ALGAE SUMMARY TABLE

ORGANISMS PER ML.

1977

SURVEY DATE		MAY 12	AUG. 4	OCT. 20		MAY 12	AUG. 4	OCT. 20
DIATOMS	1	260 TSSn		80 FC	2	240 M		
FLAGELLATES								
GREENS								
BLUE-GREENS			20 G	280 OG			60 A	40 G
DIATOMS	3	440 M		20 C	4	720 M		
FLAGELLATES								
GREENS								
BLUE-GREENS		20 A	20 G	40 A			60 AG	20 G
DIATOMS	5	200 M			6	80 MSn		100 FT
FLAGELLATES			20 E					
GREENS								
BLUE-GREENS		60 O	40 G	40 G				
DIATOMS	7	60 M			8	360 FS		20 T
FLAGELLATES				40 E				
GREENS								
BLUE-GREENS			140 A				200 O	20 G
DIATOMS	9	140 FS			10	200 MS		
FLAGELLATES								
GREENS								
BLUE-GREENS			120 A	20 G				20 G
DIATOMS	11	160 M		640 T	12	240 MF		80 F
FLAGELLATES		40 E				20 E		20 G
GREENS								
BLUE-GREENS			80 A				40 G	
DIATOMS	13	120 M	260 F		14	300 M		
FLAGELLATES		160 D						20 E
GREENS								
BLUE-GREENS				860 O			100 A	20 G

NOTE: LETTERS DESIGNATE SPECIFIC GENERA IN ORDER OF ABUNDANCE, SEE KEY ON FOLLOWING PAGE.

KEY TO ALGAE SUMMARY TABLES

The following genera are specified by the letters used in the tables;

DIATOM algal group

A - Asterionella
Am - Ampiphora
C - Cyclotella
Cb - Cymbella
Ct - Cymatopleura
D - Diatoma
F - Fragilaria
M - Melosira
N - Navicula
Nz - Nitzschia
R - Rhizosolenia
S - Stephanodiscus
Sn - Synedra
T - Tabellaria

FLAGELLATE algal group

C - Ceratium
Cl - Chlamydomonas
D - Dinobryon
E - Euglena
G - Gymnodinium
M - Mallomonas
P - Peridinium
S - Synura
V - Volvox

GREEN algal group

A - Ankistrodesmus
C - Cosmarium
Cd - Cladophera
Cl - Closterium
Co - Coelastrum
M - Mougeotia
Mc - Micractinium
O - Oocystis
Od - Oedogonium
P - Pediastrum
S - Scenedesmus

BLUE - GREEN algal group

A - Anacystis
Ag - Agmenellum
An - Anabaena
C - Chroococcus
G - Gomphospheria
L - Lyngbia
M - Microcystis
O - Oscillatoria

Table 36

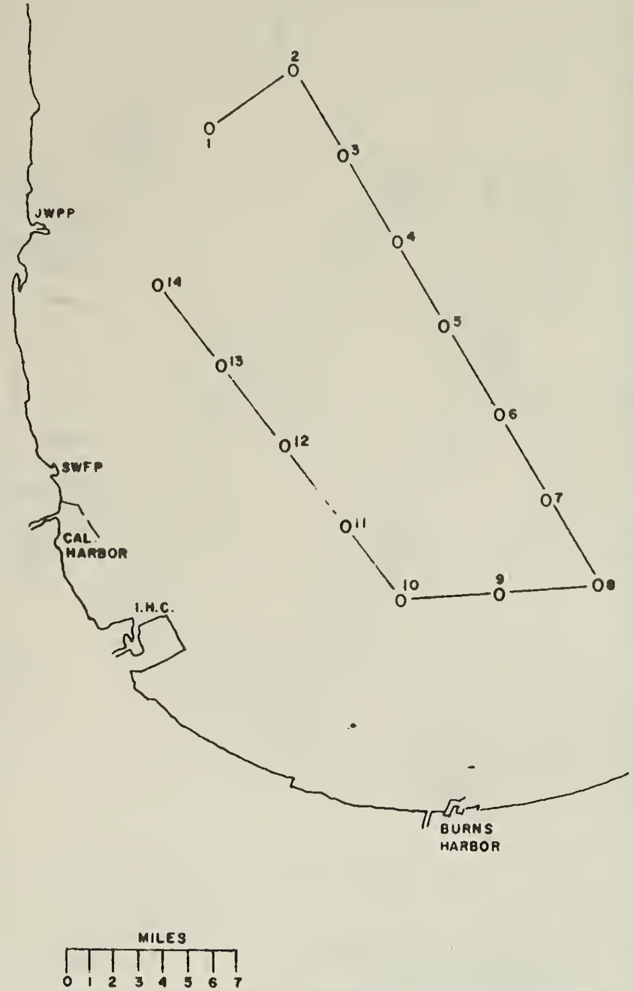
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

LAKE MICHIGAN OPEN WATER SURVEY

DATE MAY 12, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
TIME		0933	0951	1009	1027	1045	1103	1121	1139	1157	1215	1233	1251	1309	1327
TEMPERATURE °C	00010	9	7	7	6	7	7	7	8	9	9	9	8	9	9
TURBIDITY FTU	00076	0.50	0.40	0.40	0.35	0.30	0.30	0.30	0.25	0.30	0.30	0.35	0.30	0.30	0.35
pH	00400	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4
SULFATE mg/l	00945	20.0	20.0	19.0	18.5	19.5	19.2	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0
PHOSPHATE TOTAL mg/l	00650	<0.01	0.03	0.03	0.03	<0.01	0.04	0.07	0.07	0.01	0.06	0.01	<0.01	<0.01	<0.01
PHOSPHATE DISS. mg/l	00653	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SILICA mg/l	00956	<1.0	1.3	1.8	1.1	1.1	2.4	1.3	1.3	2.1	1.1	1.3	<1.0	2.4	2.4
POTASSIUM mg/l	00937	1.0	1.0	1.0	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SODIUM mg/l	00929	5.0	5.0	4.7	4.7	4.4	4.4	4.7	4.8	4.8	5.0	5.0	5.0	5.1	5.1
RESIDUE FILT. mg/l	00515	186	177	177	180	177	180	180	180	177	180	180	180	180	180
NITROGEN AMMONIA mg/l	00610	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
NITROGEN mg/l NITRATE-NITRITE	00630	0.22	0.21	0.22	0.21	0.22	0.21	0.22	0.20	0.19	0.19	0.20	0.20	0.20	0.20
PLATE COUNT 24 HRS., 35°C PER ml	31751	0	0	0	1	0	0	0	0	0	0	0	0	1	0
MF-TC PER 100 ml.	31503	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF-FC PER 100 ml.	31616	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLANKTON PER ml.	60050	260	240	260	720	260	80	60	520	140	200	180	260	280	200
ACTINOS PER ml.		0	0	1	0	0	0	0	0	0	0	0	0	1	0
FUNGI PER ml.		0	0	0	0	2	0	0	0	0	0	0	0	0	0

METEOROLOGICAL DATA							PREVAILING WINDS
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	W	W	W	W	SW	SW	W
VELOCITY	6	5	5	7	6	7	

SURVEY BY: MK / GS

REMARKS:

Table 37

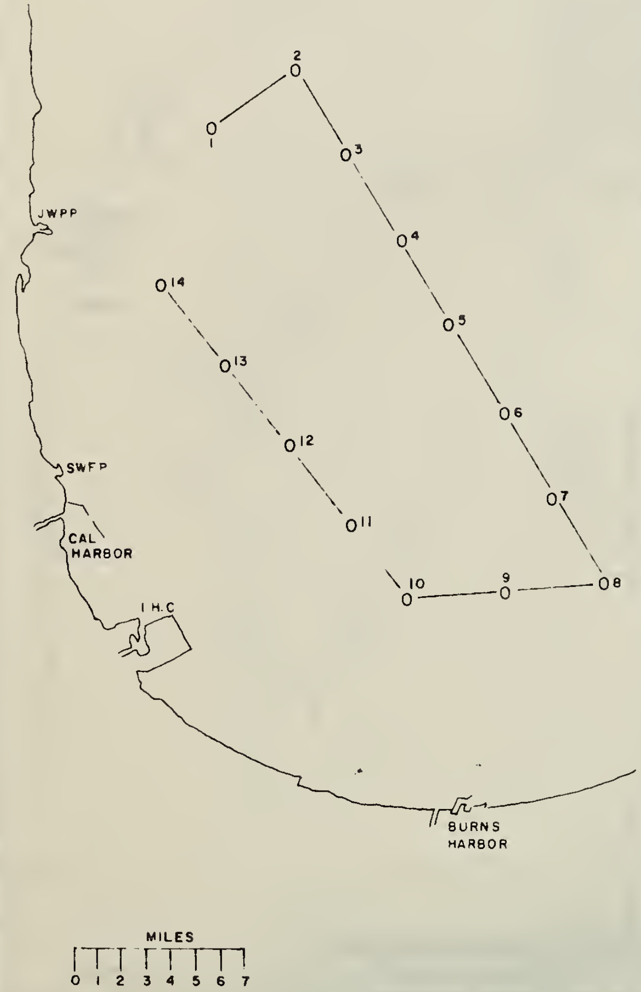
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

LAKE MICHIGAN OPEN WATER SURVEY

DATE August 2, 1977



PARAMETER	STORET NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		SAMPLING POINTS													
TIME		0922	0940	0958	1016										
TEMPERATURE °C	00010	21	21	21	21										
TURBIDITY FTU	00076	0.30	0.30	0.30	0.30										
pH	00400	8.5	8.5	8.5	8.5										
SULFATE mg/l	00945	21.5	22.0	21.3	21.5										
PHOSPHATE TOTAL mg/l	00650	0.16	0.11	0.05	0.03										
PHOSPHATE DISS. mg/l	00653	0.11	0.07	0.02	<0.01										
SILICA mg/l	00956	0.3	0.2	0.3	0.3										
POTASSIUM mg/l	00937	1.0	1.0	1.0	1.0										
SODIUM mg/l	00929	4.7	4.9	4.7	4.7										
RESIDUE FILT. mg/l	00515	-	-	-	-										
NITROGEN AMMONIA mg/l	00610	<0.01	<0.01	<0.01	<0.01										
NITROGEN mg/l NITRATE-NITRITE	00630	0.18	0.18	0.17	0.17										
PLATE COUNT 24/48HRS., 35°C PER.ml	31751	1 / 6	1 / 10	0 / 2	1 / 8										
MF-TC PER 100 ml	31503	0	0	0	0										
MF-FC PER 100 ml.	31616	0	0	0	0										
MF-FS PER 100 ml.	31679	0	0	0	0										
PLANKTON PER ml	60050	60	140	100	80										
ACTINOS PER ml		0	0	0	0										
FUNGI PER ml		1	0	1	2										

METEOROLOGICAL DATA						PREVAILING WINDS
TIME	0800	0900	1000	1100	1200	
DIRECTION	S	SW	SW	SW	SW	SW
VELOCITY	11	10	8	7	8	

SURVEY BY: HK & JS
REMARKS:

Table 38

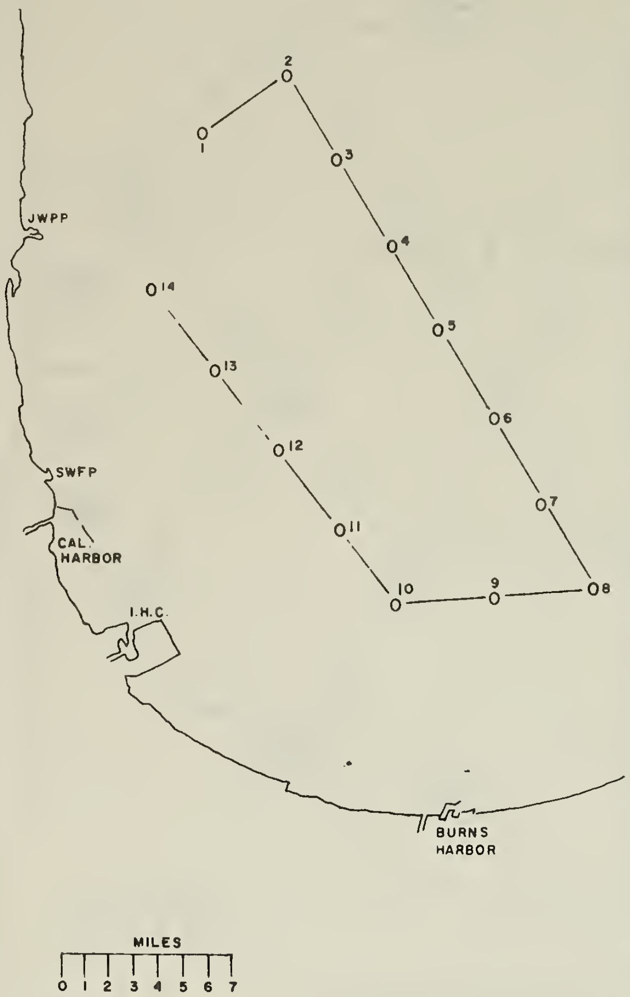
CITY OF CHICAGO
WATER PURIFICATION DIVISION

DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

LAKE MICHIGAN OPEN WATER SURVEY

DATE August 4, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
TIME		0920	0938	0956	1014	1032	1050	1108	1126	1144	1202	1222	1238	1256	1314
TEMPERATURE °C	00010	21	21	21	21	21	22	22	21	21	22	22	21	22	21
TURBIDITY FTU	00076	0.30	0.30	0.25	0.25	0.30	0.25	0.25	0.20	0.25	0.25	0.25	0.30	0.30	0.30
pH	00400	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
SULFATE mg/l	00945	19.5	19.4	19.9	19.6	19.7	20.6	20.0	19.6	20.0	19.9	20.1	19.9	20.3	20.2
PHOSPHATE TOTAL mg/l	00650	0.03	0.01	<0.01	0.01	0.01	0.01	0.01	0.01	<0.01	0.01	0.01	0.02	0.03	0.03
PHOSPHATE DISS. mg/l	00653	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01
SILICA mg/l	00956	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.3
POTASSIUM mg/l	00937	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
SODIUM mg/l	00929	4.7	5.0	4.8	4.7	4.7	4.6	4.6	5.0	4.6	4.6	4.8	4.7	4.7	4.8
RESIDUE FILT. mg/l	00515	174	174	174	171	174	174	174	174	174	174	174	174	174	174
NITROGEN AMMONIA mg/l	00610	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
NITROGEN mg/l NITRATE-NITRITE	00630	0.15	0.14	0.15	0.14	0.15	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15
PLATE COUNT 24/48HRS., 35°C PER.ml	31751	0 / 50	0 / 10	0 / 2	0 / 10	0 / 8	0 / 3	0 / 12	0 / 0	0 / 0	0 / 2	0 / 3	0 / 1	0 / 1	0 / 1
MF-TC PER 100 ml.	31503	0	2	0	0	0	2	2	2	0	2	2	0	0	0
MF-FC PER 100 ml.	31616	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLANKTON PER ml.	60050	20	60	20	60	60	0	140	200	120	20	80	40	260	100
ACTINOS PER ml.		0	0	0	0	0	0	0	0	0	0	0	0	0	0
FUNGI PER ml.		0	0	0	0	1	0	0	0	0	0	0	0	0	0

METEOROLOGICAL DATA							PREVAILING WINDS
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	S	S	S	S	S	S	S
VELOCITY	4	10	9	8	9	10	

SURVEY BY: HK

REMARKS:

Table 39

CITY OF CHICAGO
WATER PURIFICATION DIVISION

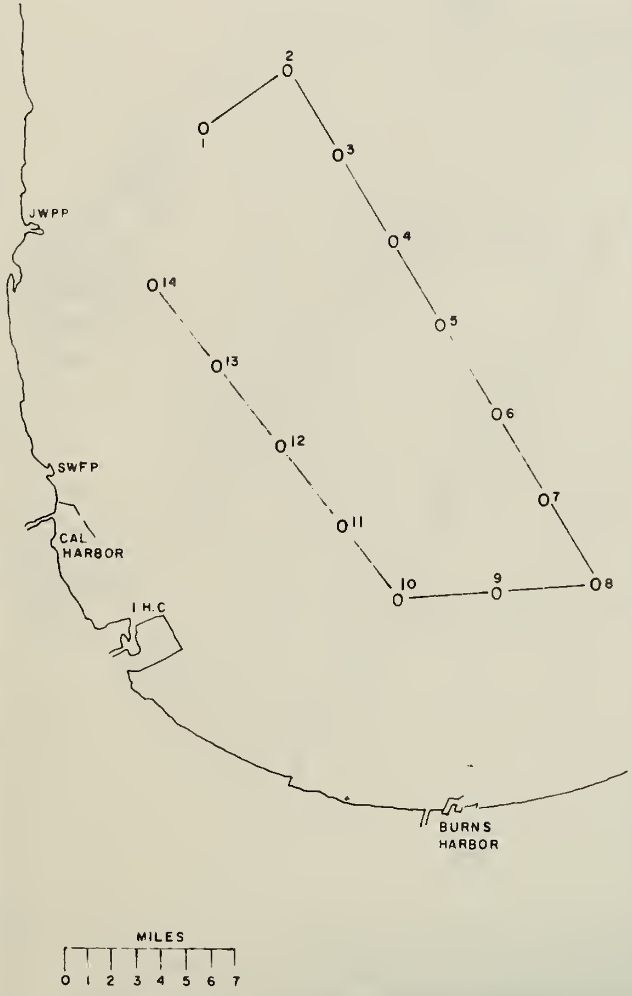
DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

PAGE 1 of 2

LAKE MICHIGAN OPEN WATER SURVEY

DATE OCT. 20, 19 77



PARAMETER	STORET NUMBER	SAMPLING POINTS 1	2	3	4	5	6	7	8	9	10	11	12	13	14
TIME		0921	0939	0957	1015	1033	1051	1109	1127	1145	1203	1221	1239	1257	1315
TEMPERATURE °C	00010	12	12	12	12	12	12	12	12	12	12	12	12	12	12
TURBIDITY FTU	00076	0.45	0.40	0.35	0.35	0.40	0.40	0.40	0.45	0.45	0.50	0.40	0.40	0.45	0.45
pH	00400	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
SULFATE mg/l	00945	21.8	21.3	21.0	21.6	21.6	21.6	21.5	21.0	22.3	22.5	22.0	22.0	21.1	22.0
PHOSPHATE TOTAL mg/l	00650	0.09	0.12	0.09	0.12	0.09	0.05	0.04	0.02	0.02	0.02	0.01	0.27	0.07	0.01
PHOSPHATE DISS. mg/l	00653	0.04	0.01	0.05	0.05	0.07	0.04	0.01	<0.01	0.01	0.01	0.01	0.20	<0.01	<0.01
SILICA mg/l	00956	2.4	1.8	1.8	2.4	2.6	1.4	3.0	2.0	1.2	1.2	1.2	0.4	1.4	1.2
POTASSIUM mg/l	00937	1.0	1.0	1.2	1.1	1.2	1.1	1.1	1.0	1.0	1.1	1.1	1.0	1.1	1.0
SODIUM mg/l	00929	4.6	4.8	4.8	4.6	4.9	4.5	4.6	4.3	4.3	4.6	4.7	4.7	4.7	4.6
RESIDUE FILT. mg/l	00515	180	177	177	177	177	177	177	180	177	177	177	177	177	177
NITROGEN AMMONIA mg/l	00610	0.02	0.00	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02
NITROGEN mg/l NITRATE-NITRITE	00630	0.17	0.17	0.16	0.16	0.16	0.14	0.15	0.20	0.14	0.14	0.16	0.16	0.24	0.17
PLATE COUNT 24/48HRS., 35°C PER ml	31751	1/2	0/0	3/4	4/6	2/3	7/10	5/7	8/10	2/5	5/10	4/6	3/4	7/12	1/3
MF-TC PER 100 ml.	31503	0	0	0	0	4	0	0	12	0	0	0	0	0	0
MF-FC PER 100 ml.	31616	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF-FS PER 100 ml.	31679	0	0	0	0	0	0	2	0	0	0	0	0	0	0
PLANKTON PER ml.	60050	360	40	60	20	40	100	40	40	20	20	640	100	860	40
ACTINOS PER ml.		2	0	0	3	0	2	1	0	2	0	1	0	0	0
FUNGI PER ml.		1	0	0	2	0	0	0	0	1	1	0	1	1	1

METEOROLOGICAL DATA							PREVAILING WINDS
TIME	0800	0900	1000	1100	1200	1300	
DIRECTION	W	W	SW	SW	S	S	SW
VELOCITY	5	6	6	6	9	8	

SURVEY BY: M. Kniahynycky & J. Esposito

REMARKS:

Table 39 (cont'd)

CITY OF CHICAGO
WATER PURIFICATION DIVISION

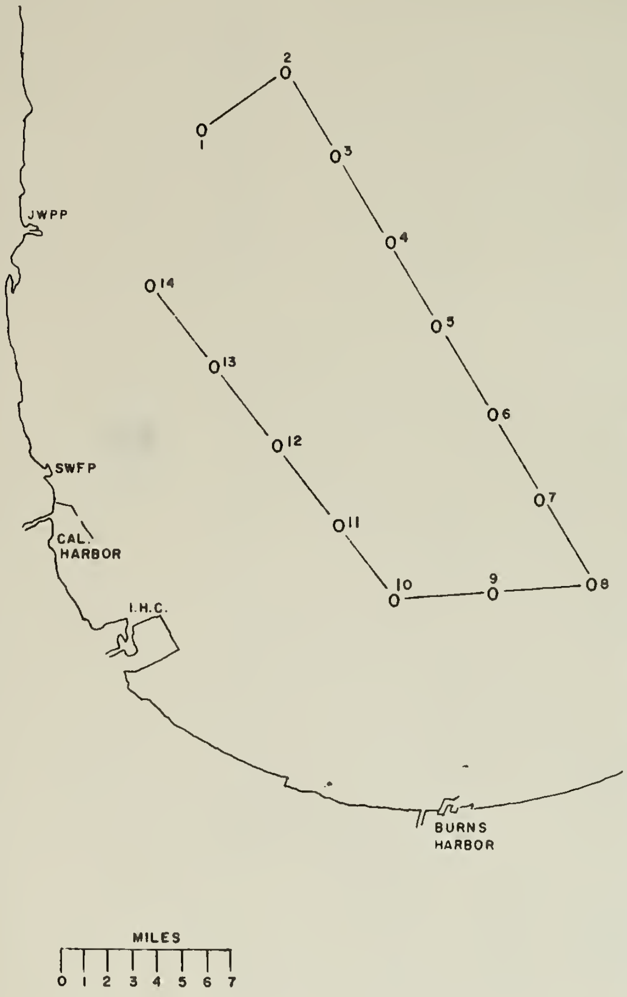
DEPARTMENT OF WATER AND SEWERS
WATER QUALITY SURVEILLANCE SECTION

BUREAU OF WATER OPERATIONS
WATER PURIFICATION LABORATORY

PAGE 2 of 2

LAKE MICHIGAN OPEN WATER SURVEY

DATE Oct. 20, 1977



PARAMETER	STORET NUMBER	SAMPLING POINTS 1	2	3	4	5	6	7	8	9	10	11	12	13	14
TIME															
TEMPERATURE °C	00010														
ODOR	00086	2G	2G	1G	1G	1G	1MG	2MG	2MG	2MG	1M	1M	1G	1MG	1MG
CHLORIDE mg/l	00940	9.2	9.2	10.0	9.6	9.2	9.2	9.1	9.1	9.2	9.3	9.2	9.1	10.0	9.7
OXYGEN DEMAND CHEMICAL mg/l	00340	5.1	4.0	3.0	26.0	24.2	16.1	4.0	3.0	7.1	4.0	3.0	17.1	5.1	1.0
NITROGEN ORGANIC mg/l	00605	0.16	0.16	0.16	0.12	0.12	0.12	0.12	0.16	0.12	0.12	0.12	0.12	0.08	0.08
PHOSPHATE DISS. mg/l	00653														
SILICA mg/l	00956														
POTASSIUM mg/l	00937														
SODIUM mg/l	00929														
RESIDUE FILT. mg/l	00515														
NITROGEN AMMONIA mg/l	00610														
NITROGEN mg/l NITRATE-NITRITE	00630														
PLATE COUNT 24 HRS., 35°C PER.ml	31751														
MF-TC PER 100 ml.	31503														
MF-FC PER 100 ml.	31616														
MF-FS PER 100 ml.	31679														
PLANKTON PER ml.	60050														
ACTINOS PER ml.															
FUNGI PER ml.															

METEOROLOGICAL DATA							PREVAILING WINDS
TIME							
DIRECTION							
VELOCITY							

SURVEY BY:

REMARKS:

Section C

Fish Flesh Monitoring

Section C

Fish Flesh Monitoring

Fish Flesh Monitoring

U.S. Fish and Wildlife Service data on contaminants in three key species of Lake Michigan fish show little change since 1976.

Results through 1976 show that PCB levels in the coho salmon and lake trout remain at unacceptably high concentrations well in excess of the U.S. Food and Drug Administration's standard of 5 ppm. Only the bloater is at levels near 5 ppm. Coho salmon have approximately twice the acceptable concentration of PCB's while lake trout have approximately four times the FDA standard.

Since 1969 concentrations of DDT have dropped considerably in all three species. In spite of the reduction in concentrations, the lake trout remains in excess of the 5 ppm USFDA tolerance limit. Concentrations of dieldrin remain below the USFDA standard of 0.3 ppm for coho salmon but near the 0.3 ppm level for bloaters and lake trout.

Various agencies have recommended that the consumption of Lake Michigan trout and salmon be limited because of high PCB concentrations. A study done in Michigan recommended that consumption of Lake Michigan trout and salmon be limited to one meal per week or 24 pounds per year and that pregnant women eat none at all (Humphrey, 1976). The Illinois Department of Public Health issued a sport fishermen advisory warning the general public not to eat Lake Michigan sportfish (coho salmon, chinook salmon, lake trout, rainbow trout and brown trout) more than once a week if the fish weigh seven pounds or more. The warning also recommend that preschool-age children, adolescent girls, pregnant women or nursing mothers should not eat any of these fish.

Table 40 Concentrations of pesticides and PCBs in fall collections of Lake Michigan bloaters and lake trout off Saugatuck, Michigan, and coho salmon from east-central Lake Michigan (U.S.F.W.S. Great Lakes Fishery Laboratory data).

Species and year	Number of fish	Average length (mm)	Total DDT ug/g(1)	Dieldrin ug/g(1)	Total PCB's ug/g(1)
Bloaters					
1969	120	270	9.94 (0.33)	0.27 (0.01)	-
1970	28	263	9.87 (1.44)	0.19 (0.02)	-
1971	60(2)	264	6.24 (1.13)	0.27 (0.06)	-
1972	120(3)	255	4.33 (0.48)	0.18 (0.03)	5.66 (0.95)
1973	160(3)	250	2.09 (0.26)	0.28 (0.02)	5.24 (0.37)
1974	110(3)	257	1.33 (0.14)	0.28 (0.03)	5.57 (0.31)
1975	170(3)	249	1.27 (0.20)	0.39 (0.03)	4.54 (0.36)
1976	110(3)	253	0.90 (0.06)(4)	0.35 (0.02)	4.11 (0.22)
Coho salmon					
1969	11	621	11.82 (2.69)	0.21 (0.02)	-
1970	13	651	14.03 (1.29)	0.12 (0.02)	-
1971	15	674	9.85 (1.41)	0.11 (0.01)	-
1972	10	693	7.17 (1.09)	0.13 (0.04)	10.93 (2.12)
1973	29	620	4.48 (0.34)	0.09 (0.01)	12.17 (0.77)
1974	30	665	3.82 (0.34)	0.10 (0.01)	10.45 (0.92)
1975	30	645	3.25 (0.20)	0.10 (0.01)	10.77 (0.59)
1976	30	635	2.98 (0.20)	0.08 (0.01)	9.21 (0.46)
Lake trout					
1970	18	613	19.19 (3.27)	0.27 (0.05)	-
1971	20	579	13.00 (1.76)	0.20 (0.03)	-
1972	9	648	11.31 (3.26)	0.20 (0.06)	12.86 (4.75)
1973	30	602	9.96 (1.36)	0.27 (0.03)	18.93 (2.08)
1974	30	616	8.42 (1.74)	0.30 (0.03)	22.91 (3.73)
1975	29	613	7.50 (1.25)	0.35 (0.03)	22.28 (2.90)
1976	30	606	5.65 (1.04)	0.30 (0.02)	18.68 (2.66)

---

(1) Concentrations in whole fish, wet weight with 95% confidence interval in parentheses.

(2) Composite samples, 5 fish/sample.

(3) Composite samples, 10 fish/sample.

(4) ppDDT plus ppDDE measured as DDE in saponified samples.

Section D

Illinois Discharges and Pollution Sources

Section D

Illinois Discharges and Pollutional Sources

Abbott Laboratories (Manufacturer of pharmaceutical products)

In September of 1976 Abbott diverted its wastewater discharge from Lake Michigan to the North Shore Sanitary District sewage treatment plant in Gurnee. Cooling water continues to be discharged to Lake Michigan.

Commonwealth Edison Company, Waukegan Station (fossil-fueled power generating station)

This plant has been in operation since 1927. It utilizes Lake Michigan water for condenser cooling and discharges heated cooling water back to the lake. The maximum temperature rise through the condensers is 12°F. This station also has an ash pond discharge to the lake.

The facility has successfully demonstrated that their thermal discharge will not have a detrimental affect on the ecology of Lake Michigan and the request for relief from closed cycle cooling (off-stream cooling requirements) has been approved by the United States Environmental Protection Agency and the Illinois Pollution Control Board. Treatment facilities to bring miscellaneous, non-thermal discharges (including ash and coal pile handling systems) into compliance with applicable standards have been permitted by the Agency and construction is estimated to be completed in December, 1978.

Commonwealth Edison Company, Zion Station (nuclear-fueled power generating station)

Initial plant operation began in 1972. This station utilizes Lake Michigan water for condenser cooling and discharges heated cooling water back to the lake. The maximum temperature rise through the condensors is 20°F.

The facility has successfully demonstrated and received approval regarding its thermal discharges. Non-thermal discharge treatment facilities, permitted by the Agency, are estimated to be completed in September, 1978.

Federal Installations

The Great Lakes Naval Training Center diverted its wastewater discharge from Lake Michigan to the North Shore Sanitary District's Gurnee sewage treatment plant in July, 1976.

The sewage treatment plant at Fort Sheridan was abandoned at the end of the year when wastewaters were diverted to the North Shore Sanitary District Gurnee treatment plant.

Johnson Outboards, Division of Outboard Marine Corporation (manufacturer of outboard motors)

Johnson Outboards has one discharge of treated process wastewater to Waukegan Harbor. Numerous other outfalls discharge non-contact cooling water, yard runoff and roof drain waters. One discharge enters Lake Michigan via a ditch located several hundreds yards north of the manufacturing facility and the others discharge into Lake Michigan, via Waukegan Harbor. In-plant treatment consists of oil separation, metal reduction and removal.

During 1975 and 1976 polychlorinated biphenyls (PCB's) were found in several discharges. The PCB's had been previously used as a hydraulic fluid in die cast machines. Studies are underway to determine the degree of PCB contamination in Waukegan Harbor and the ditch bottom sediments.

MSDGC Overflows

Sewage from all of the Lake Shore municipalities in Cook County is treated by sewage treatment facilities of the Metropolitan Sanitary District of Greater Chicago. The treated effluents are discharged to a system of waterways that are tributary to the Des Plaines River. Historically, the Chicago River and the Calumet River were tributaries of Lake Michigan. However, with the repeated outbreaks of waterborne disease epidemics experienced by Chicago in the late 1800's caused by contamination of the City's drinking water by the flow of polluted river water into the lake, the District constructed a canal system which reversed the direction of flow, diverting flows from Lake Michigan to the Mississippi River via the Des Plaines and Illinois Rivers.

Dilution of these waste flows is provided by diversion of water from Lake Michigan at three points: 1) Wilmette Pumping Station, 2) Chicago River Controlling Works and 3) the O'Brien Lock and Dam. The average diversion, for the accounting year ending February, 1977, from the Lake Michigan watershed to the Des Plaines River Watershed was 3122 CFS. This consisted of 1) 1689 CFS of domestic pumpage, 2) 566 CFS of storm runoff water and 3) 867 CFS of direct diversion.

Water levels in the waterways are regulated by the District's lock and dam facility at Lockport, Illinois. Whenever heavy rains are predicted the Lockport dam is opened, lowering the water levels to prevent flood damage. However, during severe rains, the capacity of the waterways to drain away runoff may be exceeded and one or more of the three locks may be opened causing polluted flood waters to reach the lake.

The following indicates the dates, locations, and volumes released during flow reversals in recent years:

DATE	LOCATION	(Millions of Cubic Feet)
June 30, 1977	Chicago River	39.7
June 30, 1977	Wilmette	3.9
June 11, 1977	Wilmette	5.4
April 24, 1976	Wilmette	18.0
August 21, 1975	Wilmette	17.4
April 18, 1975	Chicago River	151.0
April 18, 1975	Chicago River	12.0
September 17, 1972	Wilmette	12.0
August 25, 1972	Chicago River	7.9
August 25, 1972	Wilmette	25.5
June 14, 1972	Wilmette	2.7

The District is in the initial phases of a long-term construction program to control flooding and backflows. The tunnel and Reservoir Plan adopted by the District consists of a system of conveyance tunnels and storage reservoirs to transport and store combined sewage flow during periods of heavy rainfall. Subsequently, these flows, which are presently discharged to the waterways, would be pumped to the District's facilities for treatment.

North Shore Sanitary District (N.S.S.D.)

The Waukegan sewage treatment plant is the only remaining North Shore Sanitary District dry weather discharge to Lake Michigan. The discharge is to be diverted into the Des Plaines River in early 1978. The anticipated date of October, 1977 was not met. The wet weather overflow to Lake Michigan at Lake Forest is to be sealed by July 31, 1978. Both the North Chicago and Waukegan treatment plants are designed and permitted to discharge excess wet weather flows after settling and disinfection into Lake Michigan.

United States Steel Corporation, Waukegan Works (producer of stainless and carbon steel wire and springs)

In July, 1977 the facility completed a program diverting all process waters, after pre-treatment, to the North Shore Sanitary District. Only cooling waters continue to be discharged to Lake Michigan.

United States Steel, South Works (steel smelting plant)

A closed cycle system for process contaminated wastes was completed in December, 1975. Only non-contact cooling water is discharged from this plant to Lake Michigan and the Calumet River.

Water Plant Wastes

In the summer of 1977, wastewaters discharged to Lake Michigan from the City of Chicago Central and South water filtration plants were diverted to Metropolitan Sanitary District of Greater Chicago sewage treatment plants.

In Lake County the remaining water filtration plants discharging wastewaters to Lake Michigan at Waukegan, Highwood and Highland Park are regulated by National Pollutant Discharge Elimination System permits which include compliance schedules requiring either diversion of wastes to municipal sewage treatment plants or the construction of on-site treatment facilities necessary to meet applicable discharge standards.

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